AMERICAN VETERINARY REVIEW,

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EDITORIAL.

DR. PAUL PAQUIN "ALL RIGHT," BUT MUST NOT DO SO AGAIN.—Our first report fortunately contradicted—the good news received upon the authority of the *Breeders' Gazette*—our pleasure and congratulations at the present escape of a fearful death—the profession cannot afford the death of such a good worker. FIFTH INTERNATIONAL VETERINARY CONGRESS.—The time is approaching—our repeated calls to American veterinarians—will they answer them?—the request of President Chauveau and of Director Nocard—the Congress promises to be most interesting—the date fixed—the programme published. INOCULATION AND PLEURO-PNEUMONIA.—Our knowledge of the work done by the Bureau of Animal Industry—how is the work progressing? a positive answer difficult to give—change of officers—prospects doubtful—what will the result be?—shall we be obliged to have recourse to inoculation?—is it advantageous?—the results obtained in Australia—the letter of the Chief Inspector of Stock. HOG CHOLERA.—A collection of all that has been done in relation to it, and of all the investigations of Dr. Salmon, presented in concise book-form—advantages of such a book—principal conclusion of the author. VETERINARY LEGISLATION.—The laws of California and of New Jersey.

DR. PAUL PAQUIN "ALL RIGHT," BUT MUSTN'T DO SO AGAIN.—In last month's REVIEW we mentioned the threatening condition of Dr. P. Paquin, who was reported to have incurred the dangerous experience of an inoculation with the virus of glanders. Though we have received no direct information to the contrary, it gives us great pleasure, upon the authority of a paragraph in the *Breeders' Gazette*, to aid in the circulation of the gratifying intelligence that the Doctor has, if not wholly recovered, at least reached a condition of full convalescence. We are pleased to learn that the doubts which we intimated as to the correctness of the diagnosis in this case have been so fully certified by the event, inasmuch as the positive inoculation of glanders must in any case necessarily involve the one prognosis, which is at once adverse and absolute. With the *Gazette*, we congratulate the Doc-

tor on this fortunate postponement of his final encounter with the grim enemy. His present escape from death's clutches is good news, but we hope the Doctor will not again give us such a fright. The veterinarians of the present age cannot afford to have their ranks depleted by the loss of intelligent workers like Dr. Paquin, and our rejoicing over the news of his recovery can only be fittingly measured by the anxiety and sorrow which have been excited by the erroneous announcement of an accident which might easily occur within the limits of the most ordinary probability, in the experience of any busy veterinary practitioner.

Fifth International Veterinary Congress.—The time appointed for the Fifth International Veterinary Congress to convene is near at hand. We have on various occasions called the attention of American veterinarians to this important event, and have often expressed a hope that representatives from some of our State or national societies might be found among the delegates. This, in our view, is a matter which ought not to be overlooked by American veterinarians. We have been requested by both Inspector General Chauveau, the President, and Professor E. Nocard to remind our American colleagues of the date of the meeting, with the business to be transacted by the Congress, and it is with pleasure that we comply with their suggestions, and once more urge our friends not to miss the splendid opportunity which again occurs, of meeting and hearing some of the celebrities of our profession. The following resolutions were adopted by the Committee of Organization at their last meeting:

1. The universal (international) exhibition of horses (breeders), which will take place in Paris from the 1st to the 10th of September, being certain to attract the attendance of a large number of veterinarians, the International Veterinary Congress will consequently hold their meetings from the second to the eighth of September.

2. The meetings will be held in the hall of the Society of Geography, 178 Boulevard Saint Germain.

3. The assessment (cotisation) is fixed at 10 francs (2 dollars) entitling the subscriber to all the publications of the Congress.

4. Subscriptions (adhesions) and assessments (cotisations),

must be forwarded before the 15th of August to M. Capon, Treasurer, 193 rue de l'Universite, Paris.

5. ———

6. During the Congress the inauguration of Henri Bouley will take place at the Alfort School.

The following questions will be treated: 1. Tuberculosis; 2. International Sanitary Service; 3. Indemnities in all cases of Slaughtering; 4. Prophylaxy of Contagious Pleuro-Pnenmonia; 5. Inspection of Meats—questions of far greater interest and practical importance to nations and to communities in general than nine-tenths of the political and economic subjects which consume the time of the congresses and parliaments of the world at large.

Inoculation and Pleuro-Pneumonia.—A considerable period has elapsed since the prevalence of pleuro-pneumonia amongst the cattle of some of the eastern States was made an object of official attention, and excited more or less inquiry in popular, as well as professional circles. At the present time we believe we are wholly dependent for any knowledge which we may possess on the subject, upon such reports and movements of the Bureau of Animal Industry and its various sections as may be accessible, and if there are any interested parties who would like to be informed on the subject, or to inform others, we fear that they would become badly embarrassed were they called upon to answer the question: "How is the work of the 'stampers out' progressing?" So little is known upon the subject of this important work that whether any permanent results have been so far certainly secured, must remain, we fear, but little more than a mere conundrum, for the eastern States at least. About the only facts of which we are reasonably sure relate to the numerous official changes which have taken place of late, and, if we are not wrongly informed, which are soon to be followed by more. Efficient officers have succeeded each other quite rapidly, with their uncompleted work cut short by dismissal or by (perhaps a forced) resignation, only to see new appointees put in their places, who may have the same prospect to contemplate and so on, until—what! Too probably the elevation of some unworthy aspirant or favorite who may

rise to the leading post and make a political job out of what once was, and always ought to be, considered a strictly professional labor.

The result is a serious one from various points of view. First, and of first importance as we consider it, and most interesting to us, is the professional, since a failure in the work, through incompetency, will be sure to lower the estimation of the veterinary profession in the popular mind for years to come. Secondly, from the point of view of agricultural losses and prospective dangers. If pleuro-pneumonia cannot be stamped out within the limited bounds that it occupies at the present time, what will be the next measure to adopt against its ravages? And it is then that the subject of preventive inoculations will come forward, and that its advocates and its opposers will have an opportunity to discuss the subject some more.

On this account anything relating to that operation must always be of interest. The letter of the Chief Inspector of Stock of Australia, throws a good deal of light on the subject, and deserves our close attention and a wide promulgation. With the *Breeders' Gazette*, from which we copy it, we will say again, as we have always said: Where the disease has once gained an extended foothold, inoculation may be advisable, but when it is confined within narrow limits, as has been the case thus far in this country, a war of extermination is the only sure expedient for conquering it.

The letter reads as follows:

To the Gazette:

It will interest many of your readers to know that the Government of this colony, taking advantage of the presence in Australia of Dr. Germont and Mr. Loir—two representatives of M. Pasteur—concluded an arrangement with these scientists—with M. Pasteur's consent—to conduct a series of experiments here with a view to discovering means of cultivating or preserving the virus of bovine pleuro-pneumonia for inoculation purposes.

It may be explained that twenty-seven years' experience of the practice has fully convinced Australian cattle-owners of the efficacy of inoculation as a prophylactic; but hitherto cattle-owners have been unable to procure virus for the purpose until the disease had actually penetrated their herds, or until the conterminous herds had become infected. It was to overcome this difficulty that the Government, urged by the cattle-owners, completed arrangements with the French scientists to conduct the experiments referred to. How thoroughly they

have carried out the experiments so far will be gleaned by the enclosed clipping from the Brisbane *Courier* of this morning, containing a report of the proceedings of a demonstration yesterday, at which a number of the leading cattle-owners, medical gentlemen, and the Government veterinarian attended by invitation to witness the results of the experiments and observations of the scientists. A laboratory was fully equipped for the scientists, containing all the last and most improved appliances connected with the microscope; sterilizers, incubators, etc., etc., and they were provided with as many calves as the nature of their experiments required.

The results of the experiments so far may be summarized as follows:

1st. That it has been demonstrated that inoculation is a sure preventive of pleuro-pneumonia.

2d. That a minute quantity of virus, say two drops, inserted under the skin, behind the shoulder of a calf, will in most cases result in the death of the calf about the twenty-first day, and that in the cells under the skin on the inoculation side there will be found sufficient pure lymph to inoculate from two to three thousand head of cattle.

3d. That this lymph—even to the third, fourth, or more cultivations—is purer and equally as virulent as lymph from an animal that had contracted the disease in the natural course.

4th. That this lymph is that of the true bovine pleuro-pneumonia is proven by the fact that the scientists failed to impart the disease to goats, guinea pigs, fowls, etc., although injecting in them the same quantity of the same lymph which proved fatal in calves.

5th. That all the calves inoculated behind the shoulder—whether with original virus from a case naturally contracted, or with lymph that had passed through calves successively to the third and fourth generation (or cultivation)—presented the lesions of true bovine pleura-pneumonia.

As I notice that inoculation for pleuro-pneumonia is not in favor in America, will you permit me to state two facts in connection with the practice in Australia:

1st. We have in this colony an act providing for the registration of brands and ear-marks on cattle, which is administered by me. Under that act I set apart a particular ear-mark—namely, a piece cut "square" off the right ear—as an "inoculation ear-mark" to be used to distinguish inoculated from uninoculated cattle, and to be used *for no other purpose* under a penalty. The percentage of deaths among cattle bearing the "inoculation ear-mark" have been very trifling, while heavy among those cattle surrounding them and mixing with them that have not been inoculated.

2d. As there are nearly five millions of cattle in this colony (Queensland), to a population of 320,000 souls, by far the larger majority of our cattle are traveled to the other Australian colonies and sold as stores. So great is the faith of the Southern graziers in the efficacy of inoculation—a faith built up on many years experience—that inoculated cattle will always command a price of from fifteen to twenty per cent. more than uninoculated ones. Thus the "inoculation ear-mark" has acquired a commercial value of from ten to fifteen shillings per head.

P. R. GORDON,
Chief Inspector of Stock.

BRISBANE, March 9, 1889.

HOG CHOLERA.—The Government at Washington, through the Department of Agriculture, has been for a number of years conducting a series of scientific investigations on the subject of this scourge of the swine family, which has been for a long period and is still causing so much pecuniary loss in the various States where it prevails, and during this period various successive reports from Dr. E. Salmon, the official veterinarian of the Department, have recorded the progress which has been accomplished. These reports being, however, occasional and isolated, and only published at intervals, failed to present the results of his investigations in a consecutive and orderly form and it became difficult for those who were interested in the subject to form a clear conception of the work accomplished as a symmetrical whole. To remedy this difficulty, the Chief of the Bureau of Animal Industry has now collected and collated the several reports into book form, in a volume entitled "Hog Cholera, Its History, Nature and Treatment," and the student of the subject will be no longer obliged to search among fragmentary reports for the information of which he may be in quest. The most important of the results which have been reached may be thus summarized:

1st. The disease is a contagious and infectious one, and may be contracted by a healthy hog from a diseased one, or from infected premises, and the contagion may be carried from farm to farm in various ways.

2d. It is a bacterial disease, the germ having been first accurately figured and described in 1886, and studied almost constantly since that time.

3d. The germ is readily cultivated in various media, is transmissible to other animals than hogs, from which it may be retransmitted to swine and produce a fatal form of the disease.

4th. A fatal disease similar to hog cholera, which has been named "swine plague" to distinguish it from the disease first met with, was discovered during the progress of these investigations. It is also a germ disease, widely distributed and fatal, and may exist as a complication in outbreaks of hog cholera.

5th. The disease may generally be prevented by isolation of the animals and by cleanliness combined with simple measures of disinfection.

6th. Outbreaks of hog cholera are to be checked by separating the well from the diseased animals and practicing disinfection.

7th. Infected premises may be made safe for the admission of a new herd by disinfecting with lime or other disinfectants, and allowing three to six months to elapse after the disease has disappeared.

8th. Medicines have not been found to greatly influence the course of the disease.

9th. Inoculation has been tested in almost every form as a preventive without satisfactory results.

10th. Hog cholera is apparently identical with a disease which has recently been described in various parts of Europe.

These conclusions are all based on the investigations conducted by the Bureau of Animal Industry.

Veterinary Legislation.—We have hitherto, as occasions have occurred, kept our readers informed of the provisions of the bills which have been introduced before the Legislatures of the various States relating to the protection and regulation of veterinary practice. In this manner our friends have become acquainted with the various enactments which have thus far been perfected, and which must in due time, if faithfully administered, result in the extirpation of empiricism and quackery in the practice of comparative medicine. We take pleasure in announcing in our present number the passage of the bill presented to the Legislature of Pennsylvania, the text of which we printed some time ago, and we accompany it with the text of the two bills which have been signed by the Governors of New Jersey and of California. Much may be learned by the veterinarian who will carefully study the provisions contained in these enactments, all of them aiming, as they do, to bring about similar results, though varying in the manner of securing them. That any of them are perfect will not be expected, but that they all contain provisions from the enforcement of which the veterinary profession may largely take advantage and greatly profit, cannot be doubted, and it is to be hoped that no one will decline to accept the good which is obtainable from their operation because some desirable benefit may have been undesignedly left unprovided for. This would be but poor philosophy at the best, and, moreover, that which may have been overlooked now, may still be secured at some future time, and the comprehensive and uniform legislation, which is the thing most needed, become at length an actual and accomplished fact.

Notwithstanding the imperfection of these laws, we may fitly congratulate ourselves on their enactment, and may in fact consider them, even in their present form, as an advance upon some of those that are yet to come in old Continental Europe.

FALSE RABIES DUE TO WORMS.—*Lyon Médical* gives a summary of an article in the *Journal des Connaissances Médicales*, by Dr. A. Silvestrini, in which the author states that he has observed several cases of disease in dogs, especially hunting dogs, in Tuscany, infested with the *Strongylus gigas*. Among the symptoms is a disposition to bite, the animal avoids the light, its mouth is red and frothing, its voice is hoarse, and its gait is vacillating. Its expression is that of suffering, rather than of ferocity. The condition is somewhat difficult to distinguish from rabies, but the occurrence of hæmaturia, from the lodgment of the parasite in the urinary passages, establishes the diagnosis. The disease is fatal, except in the rare cases in which the worm is expelled by the urethra.

ORIGINAL ARTICLES.

ÆTIOLOGY OF TUBERCULOSIS.

By DR. R. KOCH, Privy Councillor.

(Translated by Rev. F. SAURE.)

(*Transactions of the Massachusetts Veterinary Medical Association.*)

(Continued from page 82.)

5.—Boy of eight years. Caseous bronchial tubes, numerous miliary tubercles in the lungs, spleen, liver and kidneys. The little knots of the lungs were thoroughly provided with large nucleusless caseous centres, and on the circumferential parts of the same, single little groups of bacilli were to be found. Tuberculous bacilli could also be proved in some giant cells on the border of the caseous centers. Bacilli-bearing giant cells were also to be found in the spleen. In this case I did not succeed in finding bacilli in the little knots of the liver and kidneys. On the contrary they were abundantly present in little nests in the bronchial glands.

6.—A strongly built and vigorous man, thirty-four years old, had suffered from a cough for about three weeks before his entrance into the hospital. Quite high fever and broncho-pneumonia symptoms, cerebral phenomena soon appeared, and by means of the opthalmoscope, tuberculosis of the choroidea could be clearly shown. Death followed fourteen days after entrance to the hospital. Caseous confluent herds in the tips of both lungs, quite large, not very thickly sown miliary tubercles in the lungs, spleen and liver, bronchial glands caseous. In the little knots of the lungs tuberculous bacilli found singly in the periphery.

Liver and spleen contained giant cells, among them some with bacilli. In the bronchial glands also, small groups of bacilli could be shown only in a few spots.

7.—Baker's apprentice, seventeen years old, anæmic, of a delicate build, had coughed for half a year, was taken into the hospital with a pleuritic exudation from the right side. Puncturing the thorax brought out 500 ccm. of clear serous liquid. Four weeks later cerebral symptoms appeared, and after another two weeks death followed. Dissection showed tuberculous pleurisy, miliary tuberculosis of the lungs and tuberculous meningitis. In the little knots of the lungs, as also in those of the pia mater, tuberculous bacilli were found and in some places very abundantly.

8.—Six-year-old girl. Bronchial glands and partly verkalkt (ossified.) Single lobuläre (lobular, lobe-shaped?) red, hepatized herds in the lungs, within which the bronchiæ were supplied with purulent contents. At the base of the brain muddy "sulzig" infiltrations of the pia. Numerous miliary and sub-miliary knots in the vessels of the fossa Sylvii. Microscopic examination showed tuberculous bacilli in small numbers in scattered spots in the bronchial glands. In the hepatized parts of the lung the alveoli were found filled with bacteria of various sorts. (aspirations pneumonia). The meningeal tubercles were very abundantly supplied with tuberculous bacilli.

9.—Workman thirty-four years of age, drunkard, treated two years before on account of scrofula of the wrist bones. Complication with "lymphangitischen" (pertaining to inflammation of the lymph vessels) abscesses on the upper part of the left foot and upper part of the thigh. Death, with cerebral symptoms, after seven weeks' stay in the hospital. The dissection showed caseous infiltration with formation of cavities in the tips of both lungs, miliary tubercles in both lungs and at the base of the brain. Quite numerous tuberculous bacilli were found in the tubercles of the lungs as well as in the meningeal tubercles.

10.—Five year old boy. Wide-spread caseous degeneration of the bronchial glands. In the tip of the left lung a caseous herd larger than a hazel nut, with the centre in a state of disorganization. A moderate number of comparatively large miliary tubercles in the lungs. Quite numerous grey and yellowish little caseous knots in liver, spleen and kidneys. The pia mater of the basis of the brain greyish, yellow "sulzig" infiltrated. Under microscopic investigation numerous tuberculous bacilli were found, partly enclosed by giant cells, in the bronchial glands; also great heaps of bacilli in the tubercles of the brain membranes. In the little knots of the lungs, liver, spleen and kidneys only comparatively few bacilli were present.

11.—A one-year-old child very much afflicted with atrophy, said to have been taken sick with a cough eight days before its arrival at the hospital. The bronchial symptoms and dyspnœa which showed themselves in the first examination, increased, and the child died two and one-half weeks later. The right upper lobe of the lung was found to be caseously infiltrated, bronchial glands caseous. Numerous miliary tubercles on the peritoneum, on the diaphragm and in the spleen. Tuberculous meningitis. In the meningeal tubercles numerous tuberculous bacilli. Nests of bacilli in the caseous parts of the lungs and in the bronchial glands. Scattered bacilli in the tubercles of the peritoneum and diaphragm, exclusively enclosed in giant cells. A moderate number of bacilli in the tubercles of the spleen.

Q.—Phthisis of the Lungs.

Twenty-nine cases were examined and the tuberculous bacilli were wanting in none of them. The number of bacilli, to be sure, varied greatly, but one could recognize here as in miliary tuberculosis, in so far a connection between the number of the bacilli and the phthisic process, that the bacilli were found most abundantly in fresh caseous infiltrations and in the interior of cavities whose environment was in a state of rapid decay. The bacilli were found less abundantly in the cavities provided with compact, callous walls; they were most scarce in scarred, shrivelled lung tissues containing much pigment. The more their number decreases the more they confine themselves to the interior of the giant cells. One may not conclude, however, that each single case conducts itself throughout in a like manner in regard to bacilli, that one phthisic lung shows throughout a great number of bacilli, another, on the contrary, ouly scattered ones. To be sure it may sometimes be so, but it will usually be found that in the same lung some parts are entirely free from bacilli, but that in single spots dense nests of the same are present. So especially may cavities of some extent appear almost or wholly free from bacilli, until, by continued investigation, one suddenly finds one or more nests of tuberculous bacilli in a hidden side indentation or encamped close beside the wall of the cavity, but not yet melted into it, and finds them, too, so thickly crowded together that even under a low magnifying power they appear as dark blue spots. For the examination of phthisic lungs it follows that one may not content himself with looking through a number of sections from any one spot, for example from a piece of the wall of a cavity, but should examine as great a variety of places as possible, and should take not too small a number of specimens from each. Only so can one get a correct conception of the behavior of tuberculous bacilli in the case in question.

After the experience gained in my investigations I should represent the relations of the bacilli to phthisic processes in the following manner: In the beginning only a few, or single bacilli get into the lung, and on account of their slow growth are very soon enclosed by a cell infiltration and thereby hindered from forcing themselves more quickly into the surroundings of the infectious spot. The bacilli, nevertheless, do not perish in the cell infiltration, but cause necrosis and caseous degeneration in the centre of the cell mass just as in miliary tuberculosis. The first beginning of phthisis would, if one could succeed in getting a sight of it, completely resemble a miliary tuberculosis. The little knot gradually takes larger dimensions and becomes constantly more unlike the miliary tubercle. An analogy of this stage might be found, however, in the not rarely occurring cases of large solitary tubercles, which do not always appear solitary but also scattered to a certain extent in various organs. These also I would consider as having proceeded from single miliary tubercles whose number is so small that they do not bring about the immediate death of their bearer, as is the case in general miliary tuberculosis, but which rather gain time for farther growth, and can finally grow to caseous herds of a good size. It is quite certain that the phthisic process takes the same development, that, namely, proceeding from a little miliary knot there grows a constantly spreading caseous herd. In the lungs the relations shape themselves very peculiarly, because the increasing caseous herd does not remain closed,

but after a shorter or longer time makes its way into the bronchiæ, empties itself and so is changed into a cavity. The further increase of the cavity goes on in a very irregular manner according as the process of vegetation in the tuberculous bacilli makes a halt in single places for a shorter or longer time, or continues, and according to this indentations or shrivelling are formed in places. Taken in general, the cavity, however large or irregular formed, retains the essential properties of the tuberculous caseous herd; necrotic masses in the interior, joined to these towards the outside nests of epithelioid cells with gigantic cells sandwiched in, and in the giant cells often tuberculous bacilli. An exception occurs only in so far as the tuberculous bacilli in the cavity appear in comparative abundance also in the interior of necrotic masses, which in the caseous herds remaining permanently closed is not usually the case. Probably this has its foundation in the fact that the masses dead, and to a certain extent used up as a breeding-ground for bacilli, are constantly being emptied, and the parting of the walls of the cavity give constantly a new food material for bacilli.

In this manner the usual chronic form of phthisis would run its course. In this usual course the vegetation of the bacilli is a very slow one and the occurrence of the bacilli very sparse, and essentially confined to the giant cells in the immediate surrounding of the cavities and to the contents of the same. The circumstance is very noteworthy that even in comparatively small tuberculous herds the growth and dispersion of the bacilli is not uniform but discontinous. In large herds, and especially in larger cavities, this behavior, which has already been touched upon, is always more striking. Widespread spaces of the cavity may be wholly free from bacilli and sometimes the bacilli may be confined to single spots of very slight extent. From this we may conclude that the conditions of life for bacilli in a tuberculous herd are not everywhere equally favorable, and probably also in regard to time may be subject to fluctuations. The bacilli must then vanish from the places which no longer give them suitable breeding-ground. In this case at one time only a temporary freedom from the parasites can take place, when the bacilli from the neighborhood later force themselves in or if spores have been left behind which may develop under more favorable conditions. At another time a lasting freedom of the diseased spot from bacilli can take place when the just mentioned conditions for the reviving of the bacilli vegetation do not occur. Shrivelling, scarring and healing will follow then in such a place. One can think that since these things may take place partially in the periphery of the tuberculous herd, the same might happen in the whole compass of the herd, and so a complete healing take place. Analogous relations are found in other diseases conditioned upon bacteria which also spread themselves out centrifugally from the original spot of infection, but can show in their progress considerable irregularities sometimes cease to grow at one point, sometimes thrive and spread rapidly, as is the case, for example, in erysipelas.

The development of a single tuberculous herd running its course in the lung under the type of chronic phthisis can be complicated in many ways, if the tuberculous bacilli in any manner get out of the reach of the original herd into other places and there give rise to the development of secondary

herds. This proceeding can complete itself in various ways. The bacilli can get into the larger blood vessels of the lungs, be strewn over the whole body in greater or lesser numbers by the course of the blood and cause miliary tuberculosis. Then, according to all appearance, the bacilli have the power of spreading themselves also by way of the course of the lymph, of forcing themselves into the bronchial glands and causing secondary tuberculous changes. The bacilli conveyed from the cavities into the air passages find by far the most frequent opportunities of fixing themselves in other places. Oftentimes they nestle themselves in other parts of the air passages and more especially into the larynx. Often if the sputum be swallowed they plant themselves in the intestinal passage.

The usual course of the phthisis must then be most affected when the bacilli-bearing pus from the cavities is on the way to be conveyed outward by the bronchiæ, but by some unfortunate disturbance of the motions of respiration is again aspirated and brought into parts of the lung until then healthy. When only a slight quantity, poor in bacilli, is aspirated, it can only bring about the beginning of a comparatively small number of infectious herds. These will gradually grow and develop into cavities according to the place that the bacilli-bearing masses reach, sometimes in the immediate neighborhood of the mother herd, sometimes some distance from it, even in the other previously healthy lung, and will from small beginnings grow just as slowly as the first tuberculous herd. But as soon as considerable quantities of the bacilli-rich contents of the cavities are breathed in, and wide-spread parts of the lung are overflowed, as it were, with infectious material, as appears not seldom to be the case, then the formation of single tuberculous knots is not the first step, but tuberculous infiltrations arise which show us by the lobed and even lobuled (lobuläre) arrangement that they came from the respiratory passages. The penetration of the tuberculous bacilli en masse has not as a consequence heaps of closed cells and the formation of giant cells, as is the case when individual bacilli appear, but necrosis of the component parts of the cells in the attacked tissue spreads widely and with comparative quickness. In consequence wide-spread caseous degenerations form in many places, also rapid dissolution of the tissue, with development of cavities which bear another character than those formerly described.

While these cavities possess compact, firm walls in which are found giant cells and scattered tuberculous bacilli, the walls of cavities formed in the decomposing and widely caseous lung tissue are permeated by a thick bacilli vegetation. They do not consist of condensed callous tissue, which only melts away slowly under the influence of the bacilli, but the wall allows us still plainly to recognize the structure of the alveoli which are filled with the caseous substance rich in bacilli, but are in the act of losing their coherence, and falling to pieces. These conditions are usually described as caseous pneumonia, acute phthisis, etc.

The most various combinations of these two just described processes, that of a tuberculous herd proceeding from a single infectious herd and spreading slowly, and the caseous infiltrations arising from a flood of infectious material, unite to give a most varied conception of the tuberculous destruction of the lungs covered by the general name phthisis.

It deserves still to be mentioned that the aspirated masses giving rise to caseous infiltration do not necessarily always spring from a tuberculous herd of the lung. Several recorded observations of animals are at my disposal which prove that a caseous ulceration of the tonsils, or a tuberculous ulcer on the superior margin of the lower jaw, which had developed itself in a rabbit in consequence of a bite, also in one case a caseous bronchial gland communicating with the air passages, can furnish the bacili-bearing masses which are breathed into the lungs. On this account therefore, also in man, tuberculous processes in the larynx, throat and mouth, as well as caseous bronchial glands, so soon as the latter empty their contents into the bronchiæ, are to be kept in sight as points of departure for caseous infiltrations of the lungs.

The conduct of the secretion of tuberculous lungs, the phthisic sputum, deserves special consideration. Since tuberculous bacilli occur in no other diseased conditions than in the tuberculous, the demonstration of their presence has great diagnostic importance. The first examinations which I made of phthisic sputum led to the result that abundant numbers of bacilli showed themselves in the sputum in half the cases examined; in other cases only a few bacilli were to be found, and in many they seemed to be wanting. But when I used Ehrlich's color treatment, and had had more practice among the by no means few cases examined, not one case more occurred in which the bacilli were wanting. I do not mean to say by this, that in single cases, after repeated investigation one may not fail to find bacilli, but in general it must be considered a settled fact, on account of the numerous results in the mean time published also by other investigators, that the bacilli, with few exceptions, constantly occur in phthisic sputum, are wanting in the sputum of other lung diseases, and thereby give an unmistakable diagnostic characteristic mark of the presence of tuberculous affections of the lungs.

The bacilli often occur in the sputum in quite considerable numbers. Apparently these are always cases in which there is rapid dissolving of the caseously infiltrated parts of the lungs, and in which the cavity walls have mixed their secretion with the sputum. The well known caseous fragments which from the beginning have been considered as a specially characteristic component part of phthisic sputum, consist almost wholly of masses of bacilli. One can think that these caseous fragments have arisen from compact bacilli masses, such as are sometimes found on the inner wall of the cavities, becoming loosened, and swept away by the secretion of the cavity. Nevertheless, one often meets cases in which the sputum is very poor in bacilli, and must look through a number of specimens, indeed sometimes must repeat the investigations for several successive days before he succeeds in discovering bacilli. The sputum investigations carried on for a long time by Gaffky with a number of phthisic patients, which are published in this volume of the "Mittheilungen" give the best idea of the frequency of bacilli in phthisic sputum.

Very often the bacilli occurring in the sputum are spore-bearing, and this appears to be especially the case when the bacilli could develop themselves unhindered and abundantly, as is the case in caseous infiltrations. Just these relations are of the greatest importance for the ætiology of tuberculosis, and we shall come back to them later.

Since the sputum is always more or less mixed with saliva, it contains regularly, beside the tuberculous bacilli, other sorts of bacteria, the abundance and variety of these depending upon the amount of saliva and mucus from the cavity of the mouth mixed with it.

If sputum is kept for some time in a vessel the tuberculous bacilli remain unchanged, both in reference to their number and to their responsiveness to coloring matter. The other bacteria, on the contrary, increase rapidly in numbers, other bacteria coming from the air or accidental defilement, appear, and a real decay develops itself very soon. Under microscopic investigation one finds, then, numberless bacteria occurring in the fresh sputum out of the cavity of the mouth, or those appearing in decaying sputum, which act in regard to color like the tuberculous bacilli. The latter always keep their intense blue color if the coloring is carried on according to the rule, while all other bacteria appear dyed brown.

It is still to be mentioned that sometimes bacteria force themselves also into the cavities, and can increase in their secretions so that, in these cases, one finds in the contents of the cavity not only tuberculous bacilli, but other bacteria. I concerned myself, nevertheless, in the few cases over which my observations of this sort extended, only with certain sorts of bacteria, so one need not suppose that a sort of decay in the contents of the cavity, as in the sputum exposed to the air, existed, but it must be assumed that of the various sorts of bacteria which accident had brought into the cavities, only certain definite kinds can thrive there. These then either lead a harmless parasitic life in the contents of the cavity, as for example, the bacteria of the green pus, which I have repeatedly found in large old cavities, or they, as it seems, take part in the destructive work of the tuberculous bacilli, as seems to me to be the case with a special sort of micrococci. The latter distinguish themselves by a peculiar arrangement, almost regularly forming groups of four, and have on that account at first sight a certain resemblance to sarcine, nevertheless in other ways distinguishing themselves essentially from these. Gaffke has studied the properties of these further* and found that they are disease-producing for many species of animals. Also, in the case in which they were first discovered, they appear to have aided in the quick destruction of the lung tissue. It is much to be wished that in future attention should be paid to these combinations of phthisis, because they must lead to the finding of such sorts of bacteria as of themselves possess no or only conditional disease-producing properties for the human organism, but under conditions specially favorable to them, as for example in an ulcerous herd of the lung, can form little nests and have a decisive influence on the further course of the process. Of how much importance such secondarily-working bacteria may be has already been mentioned in the description of miliary tuberculosis and the mixed infection occurring there.

In connection with phthisis of the lungs, some remarks may here find place in regard to the phthisis of the intestines. Among the twenty-nine cases which I had the opportunity to examine, I received in addition to parts of the phthisic

*Langenbeck's Archiv., Vol. 28, Book 3.

lung also, in eight cases pieces of the intestinum tenue with tuberculous ulcerations, and just as often caseous mesentric glands. Several times the abscesses of the intestinum tenue were surrounded by fresh tuberculous erruptions, which followed the lymph-passages.

The growth of the bacilli appears, at least so far as we can come to a conclusion from the material at my disposal, to find more favorable conditions in the intestines than is usually the case in the lungs. It should not therefore surprise us if, in the excrement of a person suffering from phthisic and tuberculous abscesses, tuberculous bacilli occur in comparatively large numbers, as Lichtheim first discovered. Among the numberless and very largely staff-formed bacteria of the intestinal contents the microscopic proof of tuberculous bacilli would have proved itself as good as impossible, if it had not been for the specific tinctorial properties of the latter, which just in this case proved themselves especially useful. Since from several sides the certainty of the proof of tuberculous bacilli in intestinal excrement has been doubted, I urged Dr. Gaffky to undertake a number of investigations. These showed that neither in the excrement of healthy persons nor in those of sick ones, who were not suffering from tuberculous diseases, any sort of bacteria were found which gave the same sort of color-reaction as the tuberculous bacilli. Also in the case of all persons afflicted with phthisis, who were examined in regard to it and who had tuberculous bacilli in the sputum, it was impossible to prove such in the excrement, but they could regularly be shown in such patients when they had plain symptoms of ulcerous disease of the intestines. One observation made by Gaffky during these investigations deserves special mention. Namely, in the contents of the intestines there not seldom occur large spore-bearing bacilli, whose bodies, like those of all other bacteria, take the brown color, while the spores remain colored more or less intensely blue. The spores appear to be more darkly blue the younger they are. When the body of the bacillus perishes and the spore alone remains, since in size it resembles a large micrococcus, it can easily be mistaken for one at first sight; especially when several spores lie near together they can be very similar to a little heap of large micrococci. Probably, therefore, the formations described by Lichtheim as blue-colored micrococci are identical with these spores. But it appears that other bacilli occurring in the intestines form spores, which by Ehrlich's color-treatment keep the blue color, for Gaffky found in the excrement of a tuberculous monkey, beside tuberculous bacilli, bacilli of still larger dimensions than those just mentioned. These had not egg-shaped, but very long-extended, almost staff-shaped, spores. The spores were fixed in the ends, and in bacilli of more than one member so arranged that in two neighboring members the spore-bearing ends were turned towards each other and followed in the manner indicated here: —·· ··— —·· ··— The points are spores, the lines bacilli-members, a peculiar arrangement of the spores to which I on another occasion have already drawn attention.* The spores of the anthrax-bacilli, hay and potato bacilli were also tried by Ehrlich's color-method and did not show the reaction, but it is nevertheless very probable that still other sorts of bacilli-spores act

*F. Cohn's Beiträge zur Biology der Pflanzen. Vol. 2, Book 3.

tinctorially as the sorts described, and that with the help of aniline reaction one would be able to distinguish these sorts of bacilli easily from others. The animal in which the bacilli with staff-shaped spores were found, died and had, as the dissection showed, beside numerous tubercles in the lungs, spleen, etc., several tuberculous abscesses in the intestinum tenue abundantly supplied with tuberculous bacilli.

From the cases of phthisis examined I will speak of a few which served as points of departure for inoculation and for the culture of tuberculous bacilli.

1.—A woman of thirty years, whose mother also died of phthisis, suffered for half a year from cough with expectoration. Great loss of flesh. Occasionally slight fever. Death after three months' stay in the hospital. Dissection showed left lung partially deformed as well the upper as the under lobe containing a number of communicating vomicæ. Right lung also deformed, containing a large baylike vomica in the upper lobe and several smaller ones in the middle lobe. Spleen, liver, kidneys free from tuberculous changes. Under microscopic investigation only a moderate number of bacilli were found in the contents of the vomicæ. In the surroundings of the vomicæ, which had compact walls, were giant cells grouped around little nucleousless herds and largely supplied with tuberculous bacilli.

2.—Man twenty-three years of age. His mother said to have suffered from phthisis. Had been in the hospital the year before on account of pleurisy. In the last few months repeated hæmoptisis. Besides this diarrhœa. At his reception into the hospital thin, anæmic. Suffocation and bronchial breathing over the point of the right lung. Cough with purulent expectoration. Death after four months. In the right lung large vomicæ with partly callous, partly caseously infiltrated walls. On the vocal chords tuberculous ulcerations. Beginning amyloid degeneration of the spleen. Numerous abscesses in the intestines, swelling and caseous degeneration of the mesentric glands. Also in this case the tuberculous bacilli were present in comparatively small numbers in the contents of the vomicæ and in the lung tissue, but, on the contrary, were very numerous at the base of the intestinal abscesses and in the caseous mesentric glands.

3.—Workman of forty-three years, quite strongly built. No heredity could be proved. Had suffered for three months from cough, expectoration and increasing weakness. Of late his troubles, especially dyspnœa, had grown much worse. Death after twelve days' stay in the hospital. In the tips of both lungs vomicæ of moderate size, wide-spread caseous infiltration with occasional softening and formation of vomicæ in the middle and lower parts of the lung. Ulceration in the larynx. In the vomicæ as well as in the caseously infiltrated lung tissue, bacilli were found in great quantities.

4.—Man of thirty-two years, not hereditarily burdened. Said to have been sick only four weeks. At his reception into the hospital anæmic, emaciated. Death after six weeks' stay in the hospital. In both lungs numerous vomicæ of varying size whose surroundings for a considerable distance were caseously infiltrated. Some smaller vomicæ lay near the surface and showed as slight protuberances. These were used to obtain rein culturen.

5.—Servant girl of nineteen years; mother died of phthisis; had suffered for a year from cough; of a delicate build, short breathed and had profuse sweats. Death after seven weeks' stay in the hospital. In the left upper lobe of the lung a moderately large vomica. The remaining part of the lobe infiltrated and lobular? (lobuläre) caseous herds, close together, partly with central decay. On the right almost the whole lung infiltrated with greyish yellow caseous masses and with many softened spots. In the trachea flat ulcerations. In the ileum and in the beginning of the colon numerous abscesses with indented borders. Mesentric glands partly freshly caseously infiltrated. As well in the interior of the vomicæ as in the caseously infiltrated parts of both lungs extraordinary numbers of bacilli were found, mostly heaped together in nests. Also in the intestinal abscesses and mesentric gland tuberculous bacilli were present in considerable numbers.

3.—Tuberculosis of Various Organs.

The cases of tuberculosis examined by me to be mentioned under this division concern single organs which have been obtained, partly from operations, partly from sections, without my knowing anything further of the course of the disease or of the other results obtained from the sections. I can on this account only mention them summarily here.

Two cases of tuberculous abscess of the tongue. At the base of the abscesses and in places forcing themselves deep into the tissue of the tongue, thick swarms of tuberculous bacilli were found.

Tuberculous bacilli were just as abundantly present in four cases of tuberculosis of the pelvis of the kidneys, in one case of tuberculosis of the bladder and of the urethra, once in tuberculosis of the surenal gland, and in a case of tuberculosis of the uterus and of the tubi.

On the contrary, the number of tuberculous bacilli was very small in five tuberculous testicles removed by operations. They could only be proved here singly in the numerously present giant cells.

Just the same behavior showed itself also in two cases of large solitary tuberculous herds of the brain. The appearance of the bacilli here also confined itself to the giant cells.

The only case belonging here in which no tuberculous bacilli at all could be proved concerned the examination of pus which came from a tuberculous abscess of the kidneys. Inoculation with this pus had given a positive result, therefore infectious germs must have been present in the same. We shall speak of this case later and give explanation for the negative result of the microscopic examination.

4.—Scrofulous Glands.

The scrofulous glands which I have examined I owe for the most part to Privy Councillor Badeleben, who placed the same at my disposal directly after they were removed. Twenty-one cases in all were examined in which the glands showed themselves tuberculous. I understand by this the presence of epithelioid cells which are grouped in herds and enclose more or less numerous giant cells. With few exceptions, in which a necrosis and caseous degeneration of the diseased gland tissue had not yet appeared, these cells were

joined directly to the caseous herd present, and formed the immediate surrounding of the same. Only in glands which possessed a tuberculous structure of this sort could tuberculous bacilli be proved. In a number of cases, on the contrary, in which the glands were enlarged, partly also softened, and thoroughly inpregnated with herds of pus, but in which epithelioid and giant cells as well as the characteristic necrosis of the tissue were wanting, no bacilli were found.

The tuberculous or scrofulous glands examined belonged to twenty-one different patients. Of these eleven were between the ages of ten and twenty years, seven between the ages of twenty and thirty, one each thirty-seven, thirty-nine, and three. The glands had been situated fifteen times on the neck and in the submaxillary region, three times in the back of the neck, twice in the axilla, and once in the region of the cubitus. In the last case, that of a three-year-old boy, there existed at the same time caries of the wrist on the same side. In three cases there had been a relapse after the first operation, and this had caused a second excision of the glands. In several cases it was stated that phthisis was hereditary in each family.

In general the tuberculous glands in reference to their contents of tuberculous bacilli were very uniform. In the interior of the caseous herd I have found the bacilli only in two cases, and even here only individual specimens. The bacilli appeared only exceptionally and individually between the epithelioid cells. On the contrary, among the giant cells there were always some, occasionally many, which contained one or two tuberculous bacilli. Giant cells with a larger number of bacilli, as one so often finds them in bronchial and mesentric glands, I have never been able to find in scrofulous glands.

In the three cases in which after a time a second gland extirpation took place, the glands twice showed themselves to have the same constitution as in the first examination. The third of these cases which is noteworthy in other respects, was as follows: strongly built man of thirty-four years. A year before large gland tumors had grown on the neck and in both axillæ, and at the same time a high degree of anæmia had developed. In the lungs no tubercles could be shown. The tumors which had been excised had the figure and size of potatoes, were of a soft, almost marrow-like constitution, and without caseous changes in the interior. The microscopic investigation showed that in the swelled mass numberless little herds of epithelioid cells were imbedded, which contained in their midst one or more giant cells. In many of these giant cells one or at most two tuberculous bacilli were found. Very rarely it occurred that one bacillus was situated in the interior of an epithelioid cell, close beside the nucleus of the same. Scarcely a year after the removal of these glands, almost equally large tumors have developed themselves anew on the same spots. These were extirpated again and showed the same microscopic conduct, only with the exception that the number of bacilli-bearing giant cells had decidedly increased in comparison with the previous tumors.

5—Tuberculosis of the Joints and Bones.

There were examined by me thirteen tuberculous joints, three hip joints, five knee joints, three elbow joints, one foot joint, and one finger joint; further,

ten tuberculous affections of the bone, thus divided: three times on wrist bones, five times on ankle bones, twice vortex caries (of these last in one case only the pus was examined). To a great extent I owe this material for examination to Privy Councillor Bardeleben.

The granulation-tissue which is formed in the surroundings of tuberculous joints and bones offers no essential difference in the single cases. The same appearances repeat themselves constantly in the structure of the tissue and in the arrangement of the bacilli, and resemble completely the description given of scrofulous glands. One finds just the same more or less scattered and often confluent herds of epithelioid cells which surround giant cells, and also here the occurrence of bacilli is confined almost exclusively to the giant cells. In the caseous, nucleusless spots, as well as in the pus secretions, the attempts to find scattered bacilli only succeeded in some cases. Also in this respect tuberculosis of the bones and joints conducts iiself exactly like that of the scrofulous glands.

The bacilli could be proved in all the cases. Only in the abscess pus coming from the vortex caries was it impossible to find tuberculous bacilli. But inoculation with this pus, as was formerly mentioned of the pus of a tuberculous abscess of the kidneys, gave a positive result.

6.—Lupus.

According to the anatomical investigations of Friedlænder and the positive results of inoculation which Hüter and Schüller have obtained, it was to be expected that lupus must also belong to the group of genuine tnberculous diseases. I therefore used the opportunity offered to me by Director Hahn, Prof. Küster and Prof. Lewin, soon after the publication of my first communication concerning the ætiology of tuberculosis, to examine a nnmber of cases of lupus in order to gain certainty in regard to this supposition.

Seven cases of lupus were investigated, which all had the most decided symptoms and were watched for a long time in the hospital, so that no doubt of the correctness of the diagnosis can be entertained. From four cases I received excised pieces of the skin, from the other three cases lupus substance scraped out. For direct microscopic examination only the excised pieces of skin were suitable. In all four cases, though only a few specimens in each, tuberculous were found, only, however, in the interior of giant cells. The tuberculous bacilli are so scattered in the lupus tissue that in two cases the bacilli were not found until from one twenty-seven sections, from the other forty-three sections had been examined. Nevertheless, it happened repeatedly that when in a succession of sections not a single bacillus showed itself, sections followed each other quickly with from 1—3 bacilli. More than one bacillus I have never seen in a giant cell in lupus.

It may for the present be remarked here that of all the seven cases, inoculations were made into the anterior eye-chambers of rabbits, which without exception produced tuberculosis of the iris, and in those animals which were allowed to live for a longer time, general tuberculosis. In these tubercles resulting from inoculation numerous tuberculous bacilli were found. From one case (excised piece of skin from the cheek of a ten-year-old boy suffering from

lupus hypertrophicus) success was obtained in getting reniculturen of bacilli, which have also been used for the successful inoculation of animals.

B.—TUBERCULOSIS IN ANIMALS.

By the study of the appearances under which tuberculosis runs its course, in the various sorts of animals, the noteworthy fact is manifest that tuberculosis conducts itself differently in the case of almost every species. However striking this fact at first appears, it nevertheless corresponds to the observations made in regard to other bacteria diseases. So, inflammation of the spleen in a similar manner is different in different animals; septicämie of mice, conditioned upon very small bacilli, offers another example, for when it is inoculated it kills mice, but in rabbits only causes an erysipelas-like disease confined to the skin.

Until now no warm-blooded animal is known which is entirely unresponsive to the infection of the tuberculous virus, and one may therefore expect that many varieties will show themselves in the anatomical aspect of tuberculosis in the various species of animals.

However various the forms which the symptoms of tuberculosis may take in single species, and however little one may be inclined to explain human phthisis and a tuberculosis of a guinea pig caused by inoculation as the same sort of disease, nevertheless between these extremes there are found, partly in the same species, still more in other species, transitional forms of tuberculosis which cause the apparent gulf to vanish. But the complete unity of the tuberculous processes of different species of animals shows itself to be irrefutable when we look away from the constitution of the tuberculous organs as seen by the naked eye, and from the secondary changes in the same, such as caseous degeneration and calcination, and keep to the primary structure of the tubercle, which, as we have already seen, repeats itself with typical regularity in all the various processes in man, and equally so in the apparently so different forms of tuberculosis in the various species of animals. The differences in the tuberculosis of different species of animals which most attract the eye concern only those secondary changes which in the one case lead to wide-spread coagulation-necrosis without caseous degeneration (liver and spleen of guinea pigs); in another to rapid softening and the formation of a thinly liquid, pus-like secretion (tubercle of the monkey); further to transformation into hop-like caseous substance (tuberculosis of man); to simultaneous calcination and caseous degeneration (pearl distemper of cattle); to the formation of hard swollen masses with deposited lime "concrementen" (tuberculosis of the fowl)—and so forth. The primary changes in all these cases are histologically exactly alike. Somewhat the same is true in regard to the formation of pus in various animals. So the pus formed in consequence of a simple inflammation in the rabbit and the fowl has an entirely different constitution than that of man, and yet in this case one would not speak of different sorts of pus formation.

It would lead too far if the special peculiarities of every single kind of animal should be described in detail, and I shall therefore be obliged to confine myself to a brief characterizing of the different forms.

1.—Perlsucht of Cattle.

The tuberculosis of cattle runs its course, as is well known, almost always by the forming of little knots which do not really become caseous and perish, but become calcareous and heap themselves together in such masses that they can finally form great tumors. But beside these there occur widespread firmly caseous infiltrations of the lung tissue, as well as hollow spaces in the lungs, filled with pap-like caseous masses.

Of the last mentioned form only four cases were examined. The caseous contents of the cavities were of such a consistence that when the cavities were cut the contents could be pressed out in sausage-shaped masses. The cavities themselves appeared to have proceeded from enlarged bronchiæ. In their walls were found quite numerous giant cells, and in a number of these last one to several tuberculous bacilli. The caseous masses were, as the inoculations performed with them showed, infectious, yet no bacilli could be found in them. On the places where the "bronchi-ectatischen" cavities approached the surface of the lungs, the usual knot-shaped tumors of the "perlsucht" were found on the pleura, and showed the immediate connection with this form of cattle tuberculosis.

Of this last form eleven cases were examined in which the development of the knots of the "perlsucht" did not confine themselves to the lungs, but reached out to the diaphragm, peritoneum and omentum. Several times the mesenterial glands were tuberculously changed and impregnated with firm caseous herds. The tuberculous bacilli were wanting in no case, yet here their number was extraordinarily fluctuating. In some cases only comparatively few bacilli, and those exclusively in the giant cells of the "perlsucht" knots, were found, similarly as in scrofulous glands, and in the already mentioned caseous (cheesy) herds in the lungs of cattle. I am, therefore, not able to share the often-expressed opinion that "perlsucht" knots, in contract with the tubercles in man, are always rich in bacilli. Besides such cases as run their course slowly and always show very few bacilli, there are those in which permanently or only temporarily the number of bacilli may be very considerable.

Also, in the same lung bacilli may be found to be very numerous in some spots and very scarce in others. Sections prepared from large and hard, therefore older knots contained often only scattered bacilli in giant cells. The younger knots, on the contrary, showed themselves extraordinarily rich in bacilli and allowed the recognition of the formerly mentioned relations between bacilli and giant cells with great ease.

Besides this, bacilli are found between the small cells in snch numbers that in places they give the specimen a bluish color.

The caseous mesentric glands of cattle suffering from "perlsucht", which I received for examination, were always extraordinarily rich in bacilli. The bacilli were, on the contrary, less numerous in the ragged "perlsüchtigen" luxuriant growths, permeated with many little hard knots and taken from the pericardium of a beef-creature and also in the knots, which in such a case had their seat in the kidneys. In all the number of cases of "perlsucht" examined amounted to seventeen, and the bacilli were wanting in none of them.

2.—Tuberculosis of the Horse.

Four cases, of which, to be sure, I could not obtain all the organs, were examined, nevertheless it could easily be seen that tuberculosis of the horse takes a middle place between that of cattle and the same disease in man. In places the tuberculous formations on the peritoneum and omentum bore the greatest resemblance to the "perlsucht"-knots of cattle, while in the same cases and simultaneously, the lungs were permeated with extraordinarily numerous miliary tubercles, which give them, on the surface of the section completely, the appearance of a human lung supplied with miliary tubercles. In one case the way in which the tuberculous virus had got into the course of the blood led to miliary tuberculosis. Namely, the retroperitoneal glands were, changed into a very large tumor permeated with firm yellowish caseous herds, which partly enclosed the vena cava inferior and formed uneven protuberances towards the interior of the ven . Sections through this gland mass, and especially through the knots reaching into the vena cava, exhibited extraordinary numbers of tuberculous bacilli, partly free, partly filling the numerous giant cells. Several of the knots were softened on their surface and had plainly mingled many tuberculous bacill with the blood of the vena cava. The miliary tuberculosis had, therefore, arisen here in the same manner as it has been shown by Weigert to arise in man.

Also, in the other cases of tuberculosis in horses, tuberculous bacilli could be proved in the knots from the omentum and peritoneum, in the immensely enlarged bronchial glands, and in the tuberculous knots of the lungs, spleen and liver; and moreover, here and there they were discovered in great numbers.

3.—Tuberculosis of the Pig.

This appears to occur comparatively very often. Especially there are often found in the pig, caseous changes in the lymph glands of the neck which are of a tuberculous nature. In four cases in which I received such glands for examination, tuberculous bacilli were found each time, partly free, partly in giant cells. Besides this there occurs in a pig a peculiar form of caseous pneumonia, in which large parts of the lung are lobularly infiltrated with greyish-red to greyish-yellow colored masses and are almost completely empty of air. I have examined five cases of this form. The alveoli were here and there filled with dense heaps of tuberculous bacilli. In other places the bacilli had already forced themselves into the surrounding tissue and bacilli-bearing giant cells had formed here. In two cases one or even several bacilli-bearing giant cells frequently showed themselves free in the alveolar spaces. It here concerned itself plainly in all these cases of caseous pneumonia about a tuberculosis arising from the aspiration of considerable masses of bacilli. In one case the still fresh infection of the lung appeared to have proceeded from the tonsils, which were changed into deep ulcerations provided with a caseous base and also containing tuberculous bacilli. Once I received pieces of muscle from a pig, which were impregnated with numerous little knots for the most part calcareous. These proved themselves under microscopic examination to be tuberculous; they contained giant cells, supplied with tuberculous bacilli.

4.—Tuberculosis of the Goat and Sheep.

I only once had opportunity to examine a lung of a sheep supplied with tuberculous knots and the bronchial glands belonging with it partly caseous and calcerous. The lung tubercles contained giant cells, with not very numerous tuberculous bacilli. In the bronchial glands the bacilli were present more abundantly. One case from the goat was also at my disposal, which, to be sure, had special interest, in so far that a cavity almost as large as a fist had formed in the right as well as in the left lung, and furnished the proof that under some circumstances a condition completely analogous to human phthisis can be developed in animals. The cavities were partly filled with caseous pus. Their inner wall was sinuous, raw and fringy. Numerous giant cells with tuberculous bacilli were found in the enclosing tissue; single bacilli could also be shown in the purulent contents of the cavities. Besides this, the lung tissue in the surroundings of the cavities and for a pretty wide space was impregnated with miliary tuberculous knots, which were also provided with bacilli-bearing giant cells. Some largish knots in the spleen and liver, as well as the greatly enlarged and caseous bronchial glands, showed the same behavior.

5.—Tuberculosis of the Fowl.

This is usually endemic and not seldom destroys all the fowls of a yard. More or less rough, sometimes also perfectly smooth tumors are found in the intestines and liver of the diseased animals. These tumors are as large as peas or walnuts. In one of the cases examined one knot in the liver even reached the size of a little apple. These tumors are of a compact constitution, show themselves spotted whitish and yellowish on the intersection, and on the yellow spots are partly calcareous. In one case tuberculous knots of almost the size of a hemp-seed were present in the marrow of the bone of the long tubes (röhren). All these knots, which belong to four different creatures, were extraordinarily rich in tuberculous bacilli, these heaping themselves especially in the immediate surroundings of the calcarous parts. In the knots situated on the intestines the tuberculous bacilli could be followed into the villi intestinalis, and it is hence not improbable that they found their entrance to the inner organs from the intestines, especially also as once only scattered little knots were found in the lungs. On the other hand, it may be concluded from this result, that the bacilli can get into the contents of the intestines, be excreted with these and give rise to further infection, just as is the case in intestinal tuberculosis in man.

Tuberculosis of the Monkey.

In the case of the monkey tuberculosis acts differently, in several respects, from the tuberculosis in man. It does not usually remain confined long to one organ, but at an early stage spreads itself over the whole body. Then it does not appear in the form of numerous little knots, which have an equal size, as in human miliary tuberculosis, but leads to the formation of a larger or smaller number of tuberculous herds, whose size is very varying and which contain, especially in the liver, spleen and glands, instead of the firm caseous substance of the tuberculosis in man, a rather thinly fluid pus, so that they rather make

the impression of multiple abscesses than of tubercles. Beside these, to be sure, the typical forms of the grey tubercle with the yellowish centre occur in the lungs, on the pleura and the omentum. But these are also of various sizes and one gains the impression that the spread of the tuberculous virus in the monkey does not take place all at once, as in miliary tuberculosis in man, but is continuous and only in small quantities.

The number of tuberculous monkeys examined by me amounts to eight. In all these the disease had risen spontaneously, and apparantly the first infectious herd still existed in the lung. Only in one case had the tuberculosis proceeded from the cavitas navium. An abscess had formed in the nasal duct, which was probably caused by a wound from a scratch at the entrance of the nose, and had spread constantly but slowly farther upon the septum and the turbinated bones. The submaxilary lymph-glands swelled and became purulent. Not until then did the previously active and strong animal have trouble in breathing and become emaciated. In the dissection very numerous tubercles of varying size were found in the lung, spleen, liver and omentum.

In all the cases the tuberculous bacilli could be proved, and, moreover, in the tubercles of the most different organs. Nevertheless the number of bacilli was not very large.

7.—Spontaneous Tuberculosis of Guinea Pigs and Rabbits.

Among many hundred rabbits and guinea pigs, which were bought for experimental purposes, were experimentally used and were finally dissected, there was not a single animal which was tuberculous. Not until after the attempts at infection with tuberculous substances had begun and a large number of tuberculous animals found themselves in separate cages, but in the same room with other animals, single cases of spontaneous tuberculosis occurred among the latter. Nevertheless plainly visible symptoms of tuberculosis hardly ever showed themselves in such animals until they had spent three to four months in a room with tuberculous animals. It was a very characteristic appearance also, that when the number of artificially infected tuberculous animals decreased, the cases of spontaneous tuberculosis became correspondingly rare; the reverse being also true. For a considerable time, when only very few tuberculous animals were kept in the space used for such experiments, the spontaneous tuberculosis among the other very numerous guinea pigs and rabbits ceased entirely. The changes which were found in the animals dying from spontaneous tuberculosis distinguish themselves from those caused by artificial infection in a very characteristic manner, so that the varying methods of infection can be recognized with all certainty. There were regularly in animals dying with spontaneous tuberculosis one or more large tuberculous herds in the lungs, which were far advanced in caseous degeneration and at the same time decidedly enlarged and caseous bronchial glands. A few times larger herds were wanting in the lungs, only the bronchial glands were extraordinarily large and filled with caseous contents. The tuberculous changes had made in the other organs comparatively little progress.

The artificially infected animals conducted themselves differently according as they were infected by subcutaneous inoculation or by the inhalation of

bacilli-bearing liquids. Usually the inoculation took place in one side of the belly, and the lymph-glands situated next to the point of inoculation were found considerably swollen and caseous. The bronchial glands, on the contrary, were almost always so small that they could scarcely be found. Also in these cases the liver and spleen had undergone the greatest tuberculous changes, while the tubercles in the lungs were still comparatively small. In the case of animals infected by inhalation, which had always taken considerable numbers of bacilli into the lungs, there were found corresponding to this, not one or a few great herds, but a very large number of little tubercles in the lungs. If one considers these experiences gained from artificially infected animals, then he will be obliged to represent to himself the spontaneous tuberculosis, as it occurred under the above mentioned circumstances in guinea pigs and rabbits, as having arisen through inhalation of one or more infectious germs, that is bacilli.

Of this sort of spontaneously-diseased animals I have examined seventeen guinea pigs and eight rabbits, among them a wild rabbit, which, as the only one of ten animals of the same sort, died after three months' imprisonment, tuberculous in a high degree. These all had many, in some cases indeed extraordinarily numerous bacilli in the surroundings of the caseous herds of the lungs. In the secondarily arisen tubercles the number of bacilli was usually less. It seems to me worthy of mention, that many times, in the larger caseous herds of the lungs, the central dissolution was very far advanced, and in consequence of the same complete cavities, though of slight extent, had formed. Up to a certain degree spontaneous-inhalation-tuberculosis brings on conditions in these animals which are analogous to those of human phthisis. The infection only does not remain long enough localized, it spreads too early to other regions of the body and leads thereby to the death of the animal before important cavities can form as they occur in the human lung.

Tuberculosis of the remaining organs takes a very peculiar course in both the rabbit and the guinea pig, and moreover a different one in each. In the beginning, in both sorts of animals, the tuberculous knots in the liver and spleen have the usual characteristic appearance which they maintain in the lungs. They are miliary, gray looking little knots, with yellowish centre, and of a quite compact consistence. In guinea pigs the spleen is decidedly enlarged, and of a blackish-red color, on which background the grayish knots show very plainly. Very soon, however, the tubercles become confluent and there arise larger whitish gray islands. These too increase constantly and give the spleen a light grayish-red and blackish-red marbled appearance. Finally the light parts get the upper hand, and the spleen can then take a wholly unusual appearance, which does not in the least suggest the origin of this condition in tuberculosis, especially when it comes to little ruptures and hemorrhages in the fragile spleen-substance, by which it gets a still gayer coloring. At all events it is very peculiar that tuberculosis in the spleen of the guinea pig leads to such widespread "congulation-necrosis," but never to genuine caseous degeneration, while in the lymph-glands of these animals a decided caseous degeneration occurs. The liver of the guinea pig acts in an exactly similar manner. In the first place gray disseminated knots form, lighter parts appear,

which increase, become confluent, and become intensely yellow in color. The liver increases enormously in size, and finally looks marbled, with spots of yellow and brown. In the darker parts of the liver there are usually still fresh grey little knots to be seen.

In the dissection of a guinea pig tuberculous in a high degree, beside the lungs permeated with little grey knots, the spleen, immensely enlarged and marbled with light grey and blackish-grey, and the liver also decidedly enlarged and marbled in brown and yellow, attract the eye, and it gives a total which can be mistaken for no other disease occurring in these animals. By the microscopic investigation of a spleen or liver so changed it is shown that in the light colored parts no nucleus coloring occurs; the cells have died and indeed a sort of "coagulation-necrosis" is present. A large part of the organ is dead, but no further dissolution occurs, the organ keeps its form and has only changed its color. In these dead masses usually only scattered bacilli are to be found. Only in single cases I have seen a peculiar increase and arrangement of the bacilli in the necrotic liver tissue, of which I will speak later. The bacilli occur more or less numerously on the border of the necrotic parts, and are then frequently enclosed by giant cells.

In the kidneys of guinea pigs I have never observed tubercles visible to the naked eye.

In rabbits the spleen and liver also appear enlarged, though in a far less degree than in guinea pigs. In this animal the tubercles always remain small and insignificant in the organs named, and there are never such changes as were described in the case of guinea pigs. On the contrary, the kidneys are almost always supplied with a number of whitish knots, which grow to the size of peas. In these knots the tuberculous bacilli are usually found in abundance, and mostly arranged in nests. Sometimes also I have found urethræ which were filled with bacilli.

8.—Artificially generated Tuberculosis in Animals.

Artificially generated tuberculosis conducts itself in general just like that which arises spontaneously. It takes also the form characteristic of every special species of animals, and in fowls, for example, leads to the development of compact, knotty tumors on the intestines and the liver; in rabbits to the formation of small gray tubercles with yellowish centre in lungs and spleen, and larger whitish knots in the kidneys; and in guinea pigs causes the considerable enlargement of the spleen and liver, together with the peculiar gray or yellow marbled coloring of these organs.

Of course the various sorts of infection condition certain differences in the course of the tuberculosis in the form of the pathological changes. It is of the greatest significance whether the infection was brought about with very few bacilli or with greater numbers of them. The distinction conditioned upon this may be studied most simply in the eye of the rabbit. Namely, if as few bacilli as possible be put into the anterior eye-chamber there arise first separate little gray knots, genuine miliary tubercles, which become yellowish in the centre. Their number increases gradually, they finally become confluent and not until after a considerable time do they lead to the general caseous degeneration and destruction of the eye as well as to the appearance of tubercles in other organs. When, on the con-

trary, from the beginning an abundant number of bacilli is introduced into the eye-chamber, the first step is not the formation of single little knots, but the same appearance is manifest which has already been cursorily mentioned in the description of lung phthisis as diffuse caseous infiltration, after the aspiration of substances rich in bacilli. Also in this case the eye becomes diffusely caseously infiltrated, perishes very quickly, and the general infection, the appearance of many little gray knots in the spleen and lungs, takes place very early, usually after three weeks.

Almost the same distinction in the effect of infectious masses poor or rich in bacilli is manifest when the same are put into the abdominal cavity of guinea pigs; the one time disseminated tuberculous knots of the peritoneum aud omentum with slow progress of the process, the other time considerable thickening, shrinking, and caseous degeneration of the omentum, together with a diffused infiltration of the peritoneum, with numberless tuberculous knots of the smallest kind.

The relations are still different when the bacilli are brought directly into the course of the blood, when they reach the lungs in considerable quantities by inhalation, or when the infection occurs only from a small wound on some part of the body. In each of these cases the first stages of the changes must correspond with the mode of infection used in each case.

But in its further course the disease always takes the type of tuberculosis. Especially, the secondary tuberculous knots arising at a distance from the original spot of infection always bear one and the same character. They are in the beginning little gray knots consisting of herds of epithelioid cells, contain giant cells and tuberculous bacilli exactly like the tuberculous knots arising spontaneously, from which they are in no wise distinguished.

A special description of the conduct of the tuberculous bacilli in artificially generated tuberculosis is therefore not needed, and I can limit myself to the summary enumeration of the cases examined. These concern 273 guinea pigs, 105 rabbits, 3 dogs, 13 cats, 2 German marmots, 10 domestic fowls, 12 pigeons, 28 white mice (variety of the house mouse), 44 field mice (arvicola arvalis), 19 rats.

In these animals tuberculous bacilli were found in the tubercles without exception. On account of the great number of animals it was, to be sure, not possible to examine all the organs provided with tubercles in every separate case, and I have been obliged in most cases to prove the presence of bacilli by crushing and spreading out some tuberculous knots from the lungs or spleen on covering glasses.

If, now, the result of the microscopic investigation of tuberculous objects, as it has been minutely described in the above, be summarized, we have the following results:

In all those disease processes which, by their course as well as by their characteristic microscopic structure and the infectious qualities of their products, must be considered as genuine tuberculosis, there occur regularly in the tuberculous herds staff-shaped forms, whose presence can be proved with the help of special methods of coloring. This is the case as well in tuberculosis of man as in that of animals of the various sorts. Also the number of single cases which generally and specially were examined for the individual forms of tuberculosis is large enough to maintain that here the question is not one of an occasional but of a constant

appearance, and that therefore tuberculous bacilli are among the component parts typical of the tubercles and their products. The two single cases in which bacilli were not to be found concern the microscopic investigation of the pus of a tuberculous abscess of the kidneys and the pus from the abscess of a vortex caries. That the bacilli were really wanting in these cases can nevertheless not be maintained, because here just such products of tuberculosis were examined as are almost regularly to be found without bacilli, owing to the fact that those originally present had vanished, as has been shown in the other examinations. Without doubt bacilli would have been found in these cases also if the original spots from which the pus came could have been examined.

On the contrary, until now, however manifold the examinations of the most various disease processes in men and animals, the bacilli peculiar to tuberculosis have never been found in other diseases. Where this has been said to be the case the statements have proved themselves erroneous, proceeding from a wrong use of the methods of examination.

A second important result is that the appearance of tuberculous bacilli marks the beginning of the tuberculous process. They appear just when the first changes in the cell elements of the tissue are noticeable. Not until the tuberculous bacilli are present do the heaps of epithelioid cells, the formation of giant cells, and the especially characteristic caseous products arising from the perishing of these cell elements, appear. Further, the presence and the number of the tuberculous bacilli are in closest connection with the progress of the tuberculous process. For where the tuberculosis bears a chronic character, only few and scattered bacilli are found; where, on the contrary, it is making rapid progress, numerous and thickly heaped bacilli are present; and where the tuberculous process has come to a standstill or has run its course, the bacilli vanish.

These three facts, namely, that the tuberculous bacilli occur regularly and exclusively in tuberculosis; that they in time and place precede all the peculiar pathological changes of tuberculosis; and that their number and their appearance and disappearance stand in direct relation to the course of tuberculosis—these facts allow us to conclude with great probability that tuberculous bacilli are not an accidental accompaniment of tuberculosis, but stand in an original connection with it.

Such far-reaching consequences hang on the decision of this question, that one cannot rest in having brought it near to a solution, but must make the attempt to decide it with undeniable certainty. Moreover, a further investigation of the conditions of life and development of these parasites promised further important light on the ætiology of tuberculosis and on the ways and means of defending humanity against this most destructive disease.

The only possibility of reaching this goal lay in taking the same way which had approved itself for the investigation of other bacteria diseases. The tuberculous bacilli must be isolated from the diseased organs, bred outside of the body in "reinculturen" (pure cultures), their behavior in this way investigated, and finally tuberculosis be artificially generated by such bacilli, freed from all admixture with the disease products.

II.—ISOLATION AND REINCULTUREN OF TUBERCULOUS BACILLI.

It could be seen in advance that the obtaining of reinculturen of tuberculous bacilli would be attended with difficulties, and therefore from the beginning the

method of culture upon firm, transparent breeding ground was adopted, because this is superior to all other methods of reinculturen in certainty and ease of management. With reference to the principle which lies at the foundation of this method, as well as in regard to its difference from other treatment, and the manifold advantages which it offers, I would refer to the minute description of the same given in the earlier pages of this paper.

At first it was attempted to grow the bacilli from crushed lung tubercles on "nahrgelatine" (meat-water-pepton-gelatine), but without success. These attempts had been made in the temperature of the room, because in greater heat the gelatine becomes liquid and thereby loses all the advantages of a firm breeding ground. Since it seemed probable that the attempts failed because a temperature of 20° C. was not sufficient for the growth of the bacilli, it was necessary to supply another firm, and at the same time transparent, breeding ground, which should contain all the component parts demanded for the nourishment of bacilli. Such an one seemed to offer itself in stiffened blood serum. I had found in experiments made for the purpose of sterilizing blood serum by repeated warming, according to the method first given by Tyndall for hay-infusion, that the serum when warmed for a considerable time over 65° C., remained stiffened and transparent. Such a breeding ground can be exposed for a considerable time to temperatures which correspond with the temperature of the body, without undergoing any changes. Bacilli-bearing substances were spread out on such stiffened transparent blood-serum, and left in a breeding apparatus at 37° C. The direct examination frequently undertaken under slight magnifying power showed after some days the appearance of peculiarly shaped colonies, which, as was recognized under a stronger magnifying power, and with the use of color reaction, consisted only of tuberculous bacilli. Nevertheless, before I proceed to the more exact description of these bacilli cultures, I have still to describe the preparation of the stiffened blood serum, which in course of time has proved itself to be the most practical.

Even the flowing of the blood into the necessary vessels demands several prudential measures. As vessels for catching the blood rather high cylindrical glasses provided with a glass stopper are suitable. These are well cleaned, then washed out with a one per cent. sublimate solution, in order to kill any bacteria germs possibly clinging to them, and then washed again with alcohol to remove the sublimate. Then one lets the blood of the slaughtered animal flow immediately from the cut into these purified vessels. Nevertheless it is well not to catch the blood first flowing after the stab, because it carries away with it cut hairs and particles of dirt from the skin and fur. The vessel should be filled nearly to the rim, closed with a stopper and placed immediately in a refrigerator. As soon as the coagulation of the blood begins the vessel must be kept perfectly still, as otherwise the formation of a firm cruor would be disturbed and a quantity of red blood-corpuscles would be mixed with the serum. The blood-filled vessels remain in the refrigerator from twenty-four to thirty hours and even longer, until a good-sized layer of completely transparent amber yellow serum has formed over the cruor. When the serum is colored more or less bloody, then it contains too many red blood-corpuscles and becomes opaque in warming. The serum is now filled by means of a pipette into re-agent glasses which are provided with a wadding stopper. The pipette as well as the re-agent glasses and the wadding stopper, are previously made

free from bacteria germs by heating them at least an hour at 150–160° C. in a double walled heating box made of sheet iron. One fills the re-agent glasses about one-third with serum, and closes them immediately with a stopper made of cotton wadding. In spite of all this care there are regularly found in the blood serum bacteria germs, which come from the air, from the hair of the slaughtered animal, etc., and would very soon cause decay and decomposition of the serum if they were not destroyed. Other liquids destined for the "reincultur" of bacteria can be sterilized, that is made free from all bacteria germs, easily and certainly by boiling. This cannot be done in the case of blood serum, because by higher temperature it completely loses its transparency. There remains, therefore, only the method adopted by Tyndall in the sterilization of hay-infusion, that is, instead of heating it once to a boiling temperature, to heat it repeatedly at a temperature of 55°–60°. The bacteria, namely, if not spore-bearing, are easily killed in liquids even by a temperature of 55°. The spores, on the contrary, as is well known, endure these temperatures and do not die until the boiling point is reached. Once heating of the liquid, therefore, only kills the spore-free bacteria and leaves the spores which may be there untouched. In the medium so favorable to their growth, however, the spores germinate soon, changing themselves into bacilli, and as such cannot stand a temperature of 55° they are therefore killed by successive warmings before they have had time to form new spores. But since the spores germinate at different times, and often do not develop into bacilli until after several days, it is necessary to repeat the warming. Experience has taught that it is almost always sufficient to warm the blood serum for an hour for five successive days to free it completely from germs which are capable of development. This warming can take place in an open water bath. It is safer to use a tin vessel especially kept for the purpose and which possesses double walls filled with water and a cover constructed in the same manner, so that the warming shall be equal on all sides.

The blood serum sterilized in this manner is then stiffened, and in order to get the greatest possible surface for inoculation the re-agent glasses should be held in a very slanting position. Also tin boxes with a double bottom and a glass cover, placed in a slanting position, are practical for this purpose. The water in the bottom of the glass is so heated that a thermometer lying in the box between the re-agent glasses shows 65° C. In this temperature the serum stiffens in from half an hour to an hour. The serum of different animals is not uniform in its conduct. The serum of sheep usually stiffens most quickly, calf serum most slowly. When serum is warmed at a higher temperature, for example at 70°, it stiffens far more quickly, but it is then more difficult to keep it transparent. A well-prepared blood serum must be almost completely clear, transparent and amber-like. At most only at the lower end of the re-agent glass and in the thickest layer may it be whiter and less transparent. It must also not be too soft, but must almost have the consistence of a hard-boiled hen's egg.

During the warming, usually on the upper cooler wall of the re-agent glass, more or less steam condenses and forms drops which, when the re-agent glass is taken up flow down and collect between the deepest part of the serum and of the glass wall. A small part of the area of inoculation is covered by this liquid. Nevertheless the liquid is in so far of value that it takes up by diffusion soluble substances from the stiffened blood serum and is changed into a very good breeding

solution. When the bacteria to be cultivated are spread out upon the stiffened serum, just up to the edge of this liquid, then they develop at the same time and close by each other on the firm breeding ground and in the breeding liquid, so that their special modes of growth in liquid and upon a firm substratum can be immediately compared.

When the re-agent glasses provided with stiffened blood serum are preserved for a length of time, since the wadding stopper does not prevent evaporation of the moisture, a very gradual drying of the serum, progressing from above downwards, takes place, yet it occurs so slowly that for months a sufficiently large area suitable for cultures remains at disposal between the upper dried part of the serum and the lower part covered by the liquid.

When the sterilization of the blood serum has not succeeded, this shows itself a few days after the stiffening, especially if the serum be put experimentally into the breeding apparatus. In these cases little whitish points form which appear singly or in larger numbers, and soon enlarge. Sometimes the blood serum becomes liquid under the influence of such bacteria, then loses its clearness and becomes covered with a whitish skin. Microscopic investigation shows that we here always have bacilli which plainly have proceeded from spores germinating late. As a matter of course, only such serum glasses may be used for "reinculturen" as after several days' stay in the breeding apparatus show no trace of such impurities, but remain completely clear and transparent. For many purposes, especially when it is wished to examine the reinculturen directly with the microscope under slight magnifying power, it is to the purpose to stiffen the serum in watch glasses or other suitable vessels. Such vessels should have a glass cover as a protection against the entrance of air germs. They are further placed in glass vessels which are lined with moist blotting paper, and can so be exposed to the breeding temperature. So sure a protection from injurious impurities as the re-agent glasses closed by wadding is, to be sure, not given by this arrangement, and reinculturen continued through many repeated breedings of tuberculous bacilli are only to be carried on by the help of blood serum stiffened in the re-agent glasses.

Just as great care as the preparation of the sterilized stiffened blood serum demands is absolutely necessary when the sowing is to be made on the prepared breeding ground, if at the same time the entrance of foreign germs and the defilement of the breeding ground by bacteria and fungi is to be prevented.

As to the material to be used for sowing, that is naturally the most suitable which contains many bacilli, is of a soft nature (that the bacilli may be spread as quickly as possible), and is as fresh as possible, that is as free from the bacteria of decay. When these latter are confined to the surface of the organ which is to serve as a point of departure for culturen, it is still possible with certain precautions to obtain reinculturen of tuberculous bacilli. But as soon as the foreign bacteria have forced themselves into the deeper layers all attempts to separate the tuberculous bacilli from them in culturen will be in vain, because the bacteria of decay grow with extraordinary rapidity in comparison with tuberculous bacilli and have taken possession of the entire breeding ground before the last have reached a visible growth.

Also, when the sowing material contains very few bacilli and is of a firm consistence, there are difficulties in causing the cultures to grow. In this case, namely,

the bacill-bearing substance cannot be so crushed that the bacilli can be spread out free and upon the surface of the blood serum; on this account they remain hidden in the substance, develop there and the colonies growing in scanty numbers withdraw themselves easily from observation.

The reinculturen succeed most surely when a tubercle rich in bacilli, or richly tuberculous substance from the interior of a still slightly caseous lymph-gland of a guinea pig killed for the purpose, be used for sowing. For this purpose one should proceed in the following manner: A number of knives, scissors and pincettes are so thoroughly heated in the flame that they are freed from all bacteria clinging to them, and laid ready in such a manner that no impurities can afterward get at them. In the mean time, the animal, which must just have been killed, is spread out upon a dissecting board. In order, when cutting through the skin to avoid dusting off particles of dirt, hairs, etc., the fur of the animal should be thoroughly moistened with a one per cent. strong sublimate solution. After this one cuts through the skin with the still hot scissors and with the help of the still hot pincette, and lays it back on both sides so far that the lymph-glands of the regio axillaris and inguinalis are completely free, but the glands, if they are to be used for reinculturen, must not be touched with the instruments used in cutting the skin. With another hot pair of scissors another piece, 1-2 qu. ctm. large, is cut out from the side wall of the thorax, and the surface of the lungs laid bare. By this means a number of little tuberculous knots are made accessible, from which, as quickly as possible, with still other instruments, which must have been cooled for this operation, one or more are prepared. In order to free the bacilli contained in the little knots, one cuts or crushes these with the scissors or, still better, between two scalpels which have been previously heated and cooled. The substance broken and rubbed to pieces is then put into the re-agent glass, spread out upon the surface and rubbed with a platinum wire which has been melted into a glass staff, and has immediately before using been heated and cooled again. The re-agent glass is to be held slantingly or almost horizontally between the thumb and the forefinger, and the wadding cork must be so held in the mean time with the other fingers of the hand that impurities from coming in contact with other objects may not reach it. The placing of the substance on the stiffened serum which, for the sake of brevity may be called inoculation, must be done as quickly as possible in order that the germs of foreign organisms from the air may not get upon the inoculating substance, or into the re-agent glass. It is also advisable to undertake the experiment in a room in which no dust is stirred up, and moreover all unnecessary motions which could cause dust from clothes, etc., to get into the air are to be avoided, since experience has taught that the germs of micro-organisms cling to the particles of dust suspended in the air.

In spite of all these prudential measures the entrance of single foreign germs is not to be avoided with absolute certainty, and it is necessary in every single case to inoculate several re-agent glasses, perhaps 5-10, that if the reincultur does not succeed in the one or the other, the remainder may be free from all impurities.

In such manner as the preparation of lung tubercles for sowing has been described, must the experiments be conducted when lymph-glands, tubercles of the

spleen, etc., are to be used for culturen. One must always operate with instruments that have been made red-hot, and these must be changed every time a new layer is to be exposed. All preparatory cuts which do not touch the inoculating substance itself are to be made with hot instruments, the inoculating mass on the contrary to be cut out with cooled scissors and pincette. The constant change of instruments is necessary in order that impurities which might attach themselves to the instruments in cutting the skin and the superficial layers may not be carried into the culturen.

When the organs of animals which have just died or just been killed were at my disposal, and the sowing was carried on in the manner just described with substances containing tuberculous bacilli, the reinculturen have succeeded without exception. The result was, on the contrary, uncertain when the material from human corpses or cattle suffering from "perlsucht" was used, since there were always impurities on the surface, and it was moreover not wholly fresh when I received it. In these cases I have first repeatedly and thoroughly washed the surface of the object with one per cent. sublimate solution, then with constantly changed, glowing hot instruments taken off the upper layers one at a time, and cut the inoculating substance from a depth at which I could feel sure it was free from foreign bacteria. In this manner I usually succeeded in obtaining reinculturen from material of this sort, especially from little lung vomicæ lying near the surface whose covering was removed with hot instruments after treatment with sublimate.

After the stiffened serum is inoculated with a bacilli-bearing substance, the vessels are placed in a breeding apparatus and kept constantly at a temperature of 37° C. Not every breeding apparatus is adapted to the culture of tuberculous bacilli. The growth proceeds but slowly and the vessels must therefore remain for weeks at a time in the apparatus. When the breeding apparatus, owing to its construction, causes a rapid evaporation of liquid from the vessels, the serum dries before the tuberculous bacilli have developed into visible colonies. Especially such apparatus as are unequally warmed, so that the steam always present in them condenses on the cooler places, for example on the glass cover, and must be constantly replaced by steam developed from the culturen vessels, cannot be used. The Arsonval thermostaten are very practical; the warmth is evenly divided and the serum keeps almost unchanged in them.

In the first few days one will notice no change in the culturen in the breed ing apparatus. If a change occurs, if whitish or even other colored drops or spots appear on the surface of the serum, if these enlarge more or less quickly, becloud the liquid in the bottom of the glass, or even liquefy the serum, this is a sign that the cultur is not successful, and that foreign bacteria have forced themselves in and grown more luxuriantly than the bacilli. If one examines such drops or spots he always finds them to consist of bacilli or micrococci which, under Ehrlich's color treatment, always take a color opposite to that of the tuberculous bacilli, and are distinguished from them in size and shape.

In those little glasses which have remained free from such impurities the first suggestions of the growing colonies of tuberculous bacilli do not show themselves until after ten to fifteen days. They appear as pale white little points or spots, which lie on the surface of the serum, are without lustre, and on that account

show plainly against their moist surroundings. They can best be compared with little dry scales which are slightly attached to the serum surface. According as the inoculating substance was rubbed upon a greater or less surface, and according to the abundance of bacilli in the same, the scales develop in smaller or greater numbers and extent on the serum surface.

The single scales only reach a limited spread, so that when only a few are present they remain separated. When numerous and thickly crowded together, on the contrary, they finally unite and form a thin, grayish white lustreless coating on the serum.

(To be continued.)

ARE QUADRUPEDS SUBJECT TO HÆMORRHOIDAL DISEASES?

By Dr. J. Faust.

This question is in brief answered by William Bodenhamer, A.M.M.H., in the *New York Medical Journal*, January 12, 1889, and to find proof for his theory, he backs his opinion by veterinary literature, namely: Mr. Hill, a veterinary surgeon of London; Mr. Armatage, also a veterinary surgeon of London; Mr. Gamgee; also a Dr. Nathaniel Field, of Jeffersonville, Ind.; Prof. Gohier, of Lyons, France, and Prof. Chassier. Strange to say, the gentleman stopped short there, not mentioning a single German author, which in my judgment should have a place in veterinary literature and science. In Friedberger and Froehner's Handbuch der Speciellen Patalogie und Therapie, published in 1886, the gentleman will-find proof enough that hæmorrhoids do exist in quadrupeds. He will find clearly demonstrated there the difference of hæmorrhages from hæmorrhoids or other hæmorrhages which are not hæmorrhoids, namely, Milzbrand Apoplectische form, Petechialfieber der Pferde, de Kabafieber beim Rind, etc. This corresponds correctly with his own idea that bleeding by the rectum sometimes proceeds from other sources than hæmorrhoids.

A few words of description of hæmorrhoids: Diese diffusen oder knoten artigen Varikosen Erweiterungen der Hæmorrhoidelvanen welche theils im Submucossen sogananuta innere Hæmorrhoiden, theils im subcutanen gawalœ ausserhalt des after sogananuta æussere Hæmorrhoiden sitzen, also a symptomatology and lastly the therapeutics.

The following literature will bear evidence that quadrupeds do have hæmorrhoids.

1. Gielen Magazine, 1846, page 78.
   Gielen Magazine, 1854, page 489–494.
2. Vogel Report, 1863, page 116.
3. Spinola Handbuch der Specellen Patalogie, 1862, Vol. 2, page 255.
4. Schnelc und Kaisers Thierarzt, 1864, page 250.
5. Pflug Adam's Wochenschrift, 1865, page 73.
6. Utz. Bad Mittheil, 1873, page 116.
7. Siedamgrotzky Haubner Laud Wirthschrift Thierheilkunde, 1884, page 92.
8. Eggling, Hasse. Preuss Mittheil, 1880–81, page 57.

My personal experience proves to me that quadrupeds do have hæmorrhoids. On April ninth I was called to see a cow, which I found suffering from hæmorrhoids; this is the third time I have treated the same cow. I have also treated other cases of this kind.

The same journal, dated April 6, in an article headed "The Ascent of Man," the statement is made that the agonizing penalty is paid for the pleasure of walking on two feet instead of four, by prolapsus ani. A contradiction of this theory in veterinary literature can be found in J. Woodroffe Hill, page 214. Robertson's Practice of Equine Medicine, page 266. Prof. Willmar Zipperlen in his work, page 416, and Dr. Wm. Schwabe, page 371, is positive proof for prolapsus of the ani. In accordance with the proof I have given, quadrupeds do have hæmorrhoids, also prolapsus ani. These gentlemen must find proof for Darwinism outside of the quadrupeds.

REPORTS OF CASES.

"Careful observation makes a skillful practitioner, but his skill dies with him. By recording his observations he adds to the knowledge of his profession, and assists by his facts in building up the solid edifice of pathological science."—VETERINARY RECORD.

TUBERCULOSIS IN A DOG.*

BY AUSTIN PETERS, M.R.C.V.S.

The following case of tuberculosis in a dog illustrates the

*Transactions of the Massachusetts Veterinary Association, Monthly Meeting, February 27th, 1889.

transmissibility of this disease from mankind to the lower animals.

The animal in question was a young white poodle dog. I was first called to see him on December 29th last, and was told that he had been sick several days, and the owner's family thought he had taken cold. When I first saw him his nose was cool and moist, the respiration rapid and jerky, somewhat abdominal. The history then was that at times his nose was hot and dry, and that his appetite was capricious, sometimes good, and at other times poor.

I thought it was a bad case of bronchitis, and prescribed a simple cough syrup, telling the people of the house to let me know if he was not better in a few days. I saw him again in much the same condition December 31st, and again January 2d.

January 2d I learned more of the history of the case, which aided me in reaching a hasty, but, as was afterwards proved, a correct diagnosis.

Mrs. H., the wife of the owner of the house where the dog was kept, died of consumption November 8th last, after a long and lingering illness of over a year. The dog, then a puppy, had been given to the children of the family the previous July, and I was told that he had acquired the disgusting habit of eating the sputa coughed up by Mrs. H. from the spittoon whenever he had an opportunity, although he was continually driven away when he was noticed to be indulging his abnormal appetite.

"Is it not possible," I was asked, "that he may have taken consumption from Mrs. H.?" I thought it not only possible, but probable, and as he was the pet of the young children advised his speedy destruction. He was therefore shot that evening (January 2d) and I held an autopsy upon him the following morning.

The post-mortem examination revealed phthisis of both lungs, with a large abscess in the posterior lobe of the left. There was also a little puro-serous fluid in the thoracic cavity, and a somewhat fatty liver, which I thought might contain miliary tubercles.

Scrapings were made from the walls of the abscess, and smeared on cover glasses, and then stained for the bacilli of tuberculosis, which I found in large numbers under the microscope. In places there were clumps of bacilli, ten or twelve in number.

Cover glass preparations were also made from the liver, but revealed no bacilli or signs of tubercle; they contained, however, a large number of fat cells.

Owing to lack of time, no sections have been cut for examination from either lungs or liver.

Excepting the liver, the abdominal viscera appeared healthy. I regret to say that I did not open the stomach or intestines, but they showed no outward signs of disease. This appears to be a case of inhalation tuberculosis, rather than one of ingestion, but the bacilli no doubt gained access to the respiratory apparatus as a result of the dog's filthy habits.

We often hear stories of cats and dogs being kept as pets by consumptives, pining away and dying, but we do not often have a case recorded backed up by absolute proofs, where a post-mortem is held on the animal, and the bacilli found as final evidence of the disease.

ATRESIA ANI.

By J. Minchin, V.S.

No doubt you will be somewhat surprised to receive this from a stranger to you, but I hope you will give it your consideration, and let me know if there is any case or cases similar in the American record. I was called to see a colt Tuesday last, foaled Sunday; was all right apparently till the afternoon, when dullness appeared. On Monday got worse, would not nurse, and towards night would *paw* and try to evacuate in the usual way but without success. To my surprise I found a total occlusion of the anus which was not discovered before. I made an incision where the cul-de-sac was visible and extracted several hard pellets of the meconium, which gave him instant relief. Not been satisfied I made a transverse incision when the struggle caused it to expel quite a quantity more; then I trimmed the wound and made what to me was a good opening; put a pledget well satu-

rated with cooling lotion after cauterizing the border, and in two hours the colt was nursing and did not appear to mind it. Of course I left the pledget in so as to dilate the orifice.

CASE OF MOLLUSCOID FIBROMATA IN A HEIFER.*

By Austin Peters, M.R.C.V.S.

Mr. President and Gentlemen:

I thought the following case might be interesting, as it is unlike anything I have ever seen before.

January 31st I went to the farm of Mr. H., at Concord, Mass., the owner having requested me to come out there, a few days previous to the above date, to see a two-year-old Jersey heifer, which had a lot "little tumors on her belly, which look more like a lot of mushrooms growing upon her" than anything he could think of.

The heifer was indeed a sight to behold. The under surface was a mass of warty-looking tumors, hanging down several inches, extending forward to within three or four inches of the fore legs, and backward covering the udder and extending some distance up the escutcheon.

They were pedunculated, massed closely together, and varied in size from a pea to a hen's egg. Their surface was smooth and devoid of hair, and they looked very much like a cluster of small potatoes, or, as the owner suggested, "mushrooms," depending from the ventral surface of the body. I started to count them, but as I had to take a train back to Boston, found I had not time, but estimated their number at from six to eight hundred. I removed two or three of the largest by twisting them from their pedicles. When fresh cut in two with a knife, the cut surface presented a pearly glistening appearance and a quantity of serous fluid dripped from them; at the base blood vessels entering them could be clearly seen, which in dividing and spreading through the substance of the tumor gave a very pretty injection

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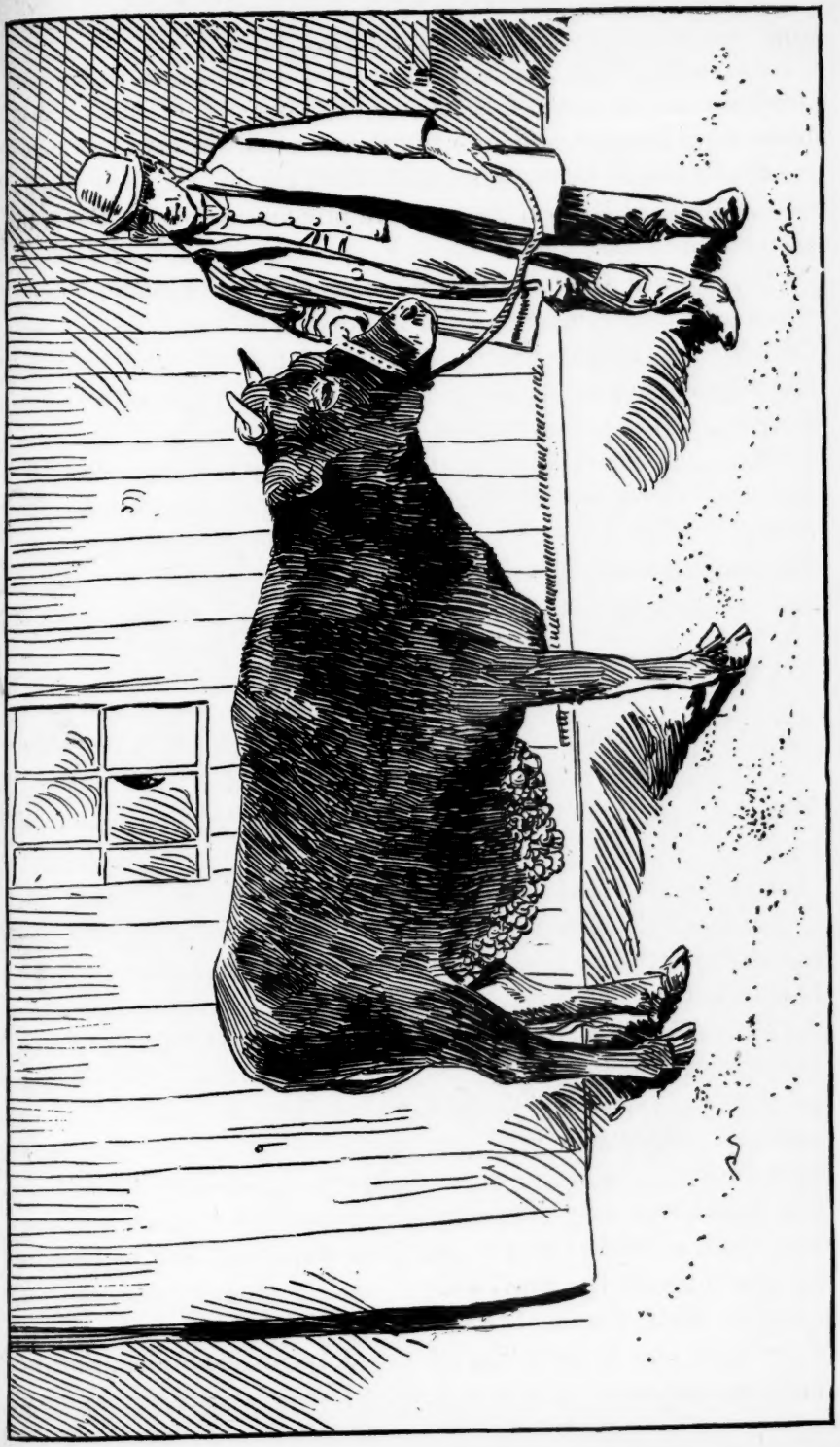
*Transactions of the Massachusetts Veterinary Association, Special Meeting, March 18th, 1889.



appearance. In some of them one or two spots of extravasated blood were to be seen, due to rupture of small vessels.

Specimens of the tumors sent to the Pathological Department of the Harvard Medical School were pronounced by Dr. Sears to be molluscoid fibromata.

The growth has been very rapid, as it was not noticed until the animal was brought up from pasture last fall, and then looked like only a few small warts. A number of small warty growths had begun to appear on the under surface of the tail, on the near shoulder, and in places on both sides of the neck.

As I did not deem it worth while to try treatment, the animal was destroyed, Mr. H. kindly having some photographs taken, of which he sent me a number, one of which it gives me pleasure to present to this Association.

VETERINARY LEGISLATION.

AN ACT TO REGULATE THE PRACTICE OF VETERINARY MEDICINE AND SURGERY IN THE STATE OF CALIFORNIA.

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. That the California State Veterinary Medical Association, a duly incorporated organization, be and is hereby recognized as authority in all questions relating to veterinary science in this State.

§ 2. That it shall be unlawful for any person to practice veterinary medicine and surgery in this State, without having previously obtained a diploma from a college duly authorized to graduate students in veterinary medicine and surgery, or is a member in good standing of the California State Veterinary Medical Association sixty days after the passage of this act, or who has passed a satisfactory examination before the Board of Examiners, as is hereinafter provided.

§ 3. This Board of Examiners, to be known as the State Veterinary Board, consisting of five duly qualified practitioners in veterinary medicine and surgery, is hereby created, whose duty

it shall be to carry out the purposes and enforce the provisions of this act. The members of said Board shall be appointed by the California State Veterinary Medical Association. The Board so appointed shall hold their offices for four (4) years. Said Board shall be paid five dollars per day and all necessary expenses while actually engaged in the duties of their office at the meetings of said Board, which shall be held at least once every six months after the appointment of said Board, such meeting to be held alternately in San Francisco and Los Angeles. Said compensation to be paid out of the fees and penalties received under the provisions of this act, and no part of the salary or other expenses of the Board shall ever be paid out of the State Treasury.

§ 4. Said Board of Examiners shall examine all diplomas as to their genuineness. Affidavit shall be made by the holder of a diploma that he is the person mentioned therein, said affidavit being sufficient guarantee that it is genuine. Each applicant not holding a diploma shall submit to a theoretical and practical examination before the Board; said examination to be written or oral, or both, and sufficiently strict to satisfy the Board that the applicant is competent to practice veterinary medicine and surgery. An examination fee of five dollars shall be paid to the Board by the holder of a diploma, and ten dollars by an applicant not holding a diploma, before examination. And in case of failure of approval, said fee shall be forfeited to the Board.

§ 5. All examinations of persons not graduates shall be made directly by the Board, and the certificates given by the Board shall authorize the possessor to practice veterinary medicine and surgery in the State of California. But said examination of ungraduated practitioners must take effect before the thirty-first day of December, 1889. After that date no certificate shall be granted except to persons presenting diplomas from legally chartered veterinary institutions.

§ 6. Upon the approval of the credentials or the examination of an applicant said Board shall grant him a license to practice in this State, and shall receive therefor a fee of five dollars, said license to be signed by all the members of the Board.

§ 7. Every person qualified, as required by this act, shall,

upon receipt of his license to practice, have said license filed in the office of the Clerk of the county in which he resides. Any person removing to another county to practice shall file the license in like manner in the county to which he removes. The holder shall pay to the County Clerk the usual fees for filing. Any failure, neglect, or refusal on the part of any person holding such license to file the same with the County Clerk as above directed, for a period of six months, shall forfeit his license; and no license when once forfeited shall be restored except on the payment to said Board the sum of twenty-five dollars as a penalty for such failure, neglect or refusal.

§ 8. Any person shall be regarded as practicing veterinary medicine and surgery within the meaning of this act who shall profess publicly to be a veterinary surgeon, or appends to his name any initials or title implying qualifications to practice, or who prescribes for or treats sick or injured domestic animals for compensation, either directly or indirectly. But nothing in this act shall be construed to prohibit members of the medical profession from prescribing for domestic animals in cases of emergency, and collecting a fee therefor, nor to prohibit gratuitous services in cases of emergency. And this act shall not apply to commissioned veterinary surgeons in the United States Army.

§ 9. Any person practising veterinary medicine or surgery in this State contrary to the provisions of this act, shall be guilty of a misdemeanor.

§ 10. This Act shall take effect sixty days from and after its passage.

AN ACT TO PROTECT THE TITLE OF VETERINARY SURGEON AND TO REGULATE THE PRACTICE OF VETERINARY MEDICINE AND SURGERY IN NEW JERSEY.

1. *Be it enacted by the Senate and General Assembly of the State of New Jersey,* That every person who shall assume, or use, or cause to be used, any title pertaining to the practice of veterinary medicine or surgery, or any of the branches of veterinary medicine or surgery, shall be a graduate of a legally chartered veterinary college or university, having the power or authority to confer the degree of veterinary surgeon or analogous title, except

as provided for in section two; and such practitioner shall be required to register in the book kept for that purpose, in the office of the county clerk of the county in which he resides.

2. *And be it enacted*, That any person who has assumed the title of veterinary surgeon or analogous title, in this State, for the five years preceding the passage of this act, without being entitled to the degree of veterinary surgeon or analogous title, shall be allowed to continue the use of the title; but such person shall appear before the county clerk of the county in which he resides and make affidavit of that fact; he shall then be recorded as an "existing practitioner."

3. *And be it enacted*, That the county clerk shall purchase a book of suitable size, to be known as the "veterinary medical register" of the county, and shall set apart one full page for the registration of each practitioner; and when any practitioner shall die or remove from the county, the county clerk shall make a note of the same, and shall perform such other duties as are required by this act.

4. *And be it enacted*, That every practitioner who shall be admitted to register shall pay to the county clerk the sum of one dollar, which sum shall be compensation in full for registration; the county clerk shall give a receipt for the same, and such registration shall take place within six months from the passage of this act.

5. *And be it enacted*, That nothing in this act shall be so construed as to prevent any veterinary surgeon (if legally qualified to use the title) from using the title of "veterinary surgeon" or analogous title, in this State; but if such veterinary surgeon opens an office or uses the title for the transaction of business, he shall be deemed "a sojourner," and shall conform to the requirements of this act.

6. *And be it enacted*, That any person who may desire to commence the practice of veterinary surgery or medicine, or any of its branches, in this State, after the passage of this act, and who holds a veterinary diploma, issued, or purporting to have been issued, by any veterinary college or university in this State, another State or foreign country, shall make affidavit before the county

clerk that his diploma has been regularly issued by a legally chartered veterinary college or university, after which such person will be allowed to register as provided for in this act.

7. *And be it enacted*, That any person who shall present to a county clerk a veterinary diploma which has been obtained fraudulently, or which is, in whole or in part, a forgery, or shall make affidavit to any false statement, intended to be filed or registered, or shall use the title of veterinary surgeon or analogous title, without conforming to the requirements of this act, or shall otherwise violate or neglect to comply with any of the provisions of this act, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished for each and every offence by a fine of one hundred dollars, one-half to be paid to the prosecutor, and the other half to be paid to the county, or shall be imprisoned in the county jail in the proper county for a term not exceeding one year, or both or either, at the discretion of the court.

8. *And be it enacted*, That no person shall recover in any court in this State any sum of money whatever for any veterinary, medical or surgical services, unless he shall have complied with the provisions of this act, and is one of the persons authorized by this act to practice as a veterinary surgeon or veterinarian.

9. *And be it enacted*, That in order to secure to the veterinary associations and societies of the State and the State Board of Health a full record of all veterinary physicians and surgeons in this State, it shall be the duty of the county clerk of each county of the State to furnish to all incorporated veterinary associations and societies of the State and to the State Board of Health a list of names of all the veterinary physicians and surgeons who have deposited with him copies of their diplomas, and the name and place of the institution purporting to confer such diploma, and each county clerk shall yearly furnish to the veterinary associations and societies of the State, and to the State Board of Health, a similar list of those veterinary physicians and surgeons hereafter depositing diplomas with him, and shall include in such list also the names of those veterinary practitioners filing affidavits with him as mentioned in the foregoing section of this act; and each county clerk shall keep in a suitable book an index of the names

of all veterinary physicians and surgeons depositing diplomas or filing affidavits in pursuance of the foregoing sections of this act.

10. *And be it enacted*, That this act shall take effect immediately

SOCIETY MEETINGS.

THE NEW JERSEY STATE VETERINARY SOCIETY.

The New Jersey State Veterinary Society held a fairly well attended meeting at the Continental Hotel, Newark, N. J., at 2:30 P. M., on Thursday, May 16th, 1889.

It was decided to hold but two meetings each year, one on the first Thursday in August, and one on the first Thursday in November.

Dr. A. F. Sellers of Camden, and Dr. E. A. Vreeland, of Jersey City, both graduates of the American Veterinary College, were elected as members.

Dr. James McCaffrey, Dr. J. Hopkins, and Dr. W. Dimond, were proposed for membership, and were referred to the Board of Censors.

Dr. J. Nagler read a paper on "Specific Medication versus Polypharmacy," which was very instructive, and Dr. W. H. Lowe gave some interesting facts regarding the law which has been passed by the Legislature last March. Both received a vote of thanks.

The next meeting will be held in New Brunswick, and it being the annual meeting, new officers are to be elected. A banquet will follow the meeting.

CHARLES KUEHNE, D.V.S., *Secretary.*

GERMAN VETERINARY ASSOCIATION OF NEW YORK AND VICINITY.

The second annual meeting of the German Veterinary Association of New York and vicinity was held at Mernhard Hall, 213 Forsyth street, New York.

Pres. A. Kuntz called the meeting to order at 8 P. M. After reading of minutes of last meeting and approval of the same, the Association proceeded to elect officers for the ensuing year as follows: President, A. Kuntz, New York. Vice-President, L. R. Sattler, Newark, N. J. Secretary, J. Serling, 105 W. 105th street, New York. Treasurer, W. M. Halpabe, Hoboken, N. J. Board of Trustees, J. Kunzli, Ph. J. Serissi, N. Y., R. Simmer, Flushing.

A paper on the "Vaccination of Cattle against Pleuro-Pneumonia," with a statement of the literature extant on the subject, was read by Dr. J. Serling, New York, in which he severely criticised the theory of Dr. Gadsden that the disease got spread by the chronic or so-called recovered cases. The discussion was unusually lively and beneficial.

J. SERLING, *Secretary.*

OBITUARY.

DECEASE OF DR. EZRA MINK—TWO DEATHS IN ONE FAMILY.

Dr. Ezra Mink, the well-known veterinary surgeon, died on March the 25th, at his home, in Rochester, N. Y., aged 65 years. He was born in Wayne County and practiced his profession in Lyons for a number of years. He went to Rochester sixteen years ago and had always been both prominent and successful in his chosen work. He was a member of the Monroe County Veterinary Medical Association. His son, William Mink, a veterinary surgeon at Sodus Point, died about three weeks before his father.

At a meeting of the Rochester Veterinary Medical Association, the following resolutions were adopted in memory of Dr. Mink:

WHEREAS, It has been the will of Divine Providence to remove from our midst, by death, one of the oldest and most noted members of our profession, Dr. Ezra Mink; a kind father, a loving husband and a cheerful companion. Realizing the loss our profession sustains in his demise, be it, therefore

Resolved, That we, "The Rochester Veterinary Medical Association," do hereby express the feelings which we hold for him as a genial and noble man and as a member of his profession; and furthermore,

Resolved, That, we tender our heartfelt sympathies to the family and friends of the deceased in this their time of great affliction; and also

Resolved, That a copy of these resolutions be transmitted to the family of the deceased and published in the daily papers and that the members of the Association attend the funeral in a body.

ALBERT TEGG,
A. DRINKWATER,
J. C. MCKENZIE,
Committee.

CORRESPONDENCE.

PRACTICE FOR SALE.

WOODSTOWN, N. J., April 29, 1889.

A. Liautard, M.D., V.S.

DEAR DOCTOR.—Owing to an injury received last fall, I am obliged to give up practice in my present location; have been quite successful here, have been here three years, and have succeeded in building a practice that is worth $2,500 per annum. The country surrounding is rich and especially adapted to stock raising, there being several large stock farms in the county, therefore a great deal of obstetrical work to be done, which together with the long drives of a country practice, and the exposure thereof, is becoming too much for me since being injured. The character of my injury (a double ventral hernia) you will readily see incapacitates me for such a practice. I intend moving to Philadelphia, and as I am anxious to have some competent person to take my practice, I take the liberty of writing you, to know if you know of a person who would like to purchase such a practice. There is no opposition here, and a good level headed, strong young man need have no fear of success. To the right sort of man will make price very reasonable and terms easy. Let me hear from you.

Yours very respectfully,

L. M. BIGNELL.

VETERINARIANS WANTED.

CHARLES CITY, IOWA.

SIR.—I am desirous of having a veterinarian locate at this place. This city has three thousand inhabitants, and the country is thickly settled, well-stocked and not a veterinary surgeon within fifty miles of this place. Please hand this to party wishing location. Shall be pleased to correspond with such parties.

FRANK A. BURTON.

DEAR SIR.—I would like to enter into a correspondence with some one that desires a location to practice. If you have any member of your fraternity that you think wishes a place, I would be much pleased to correspond with him.

ROMEO, MICH. ALBERT KENNEDY.

NEWS AND SUNDRIES.

INOCULATION AS A PREVENTIVE OF SWINE PLAGUE.—Mr. C. H. Walker, Surprise, Neb., ex-President of the Nebraska Improved Stock Breeders' Association, contributes a letter to a western paper from which the following statements are taken: "I have continued the practice [of inoculating as a preventive of hog cholera] with the same success so frequently reported to the public in former communications to various newspapers, and I shall continue it until I have reason to stop. In general, I have the same report to make as before. That is to say that inoculation is still practiced with success on my place. All the hogs that I have inoculated I have tested as soon as convenient after they have recovered and it has proved effective. I have had an experience that it might be well to relate, inasmuch as it demonstrates the importance of exactness in this business. Dr. Billings has always placed great stress on using the culture at the proper time, always urging that success would otherwise be defeated. Having been so fortunate with my inoculations, it is proper to state that I was ready to take a few chances on a little experiment of my own, and I resolved to see what the effect of this truck that the Doctor had pronounced worthless would be on the pigs, and to that end I inoculated a litter. I have got the experience, and I am happy that the cholera has got so few of the pigs. The pigs inoculated with this culture are the only ones, with a single exception, that I have lost after their recovery from inoculation. I have another straw bearing on this subject. A neighbor who lost nearly all of his hogs in the fall purchased some sows that had passed through the cholera. He also bought a boar that had not. The boar, after being placed in his infected pens, took the cholera. As a neighborly act I loaned him one of mine that had been inoculated. This was about a month since. At this writing no complaint has been received.